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SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1916.

No. 816.

MAUDE L. ANDREWS, ADMINISTRATRIX OF A. W. ANDREWS, DECEASED, PLAINTIFF IN ERROR,

vs.

VIRGINIAN RAILWAY COMPANY.

IN ERROR TO THE ROANOKE COUNTY CIRCUIT COURT, STATE OF VIRGINIA.

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IN THE

Supreme Court of Appeals of Virginia

AT WYTHEVILLE.

VIRGINIAN RAILWAY COMPANY

v.

MAUDE L. ANDREWS, ADMINISTRATRIX.

PETITION.

To the Honorable Judges of the Supreme Court of Appeals of Virginia.

Your petitioner, The Virginian Railway Company, respectfully represents that it is aggrieved by a judgment entered by the Circuit Court of Montgomery County, Virginia, on the 12th day of October, 1914, in an action at law therein pending, wherein Maude L. Andrews, Administratrix of A. W. Andrews, deceased, was plaintiff, and your petitioner was defendant. A transcript of the record of the proceedings in said Circuit Court is herewith presented.

STATEMENT.

The plaintiff's intestate, A. W. Andrews, was a locomotive engineer, employed by your petitioner. He was engaged in operating an engine on your petitioner's line between Roanoke, Virginia, and Princeton, West Virginia, on the 14th of November, 1912. While said Andrews was running one of your petitioner's engines on a trip from Roanoke to Princeton, the crown-sheet of the engine was blown down and he received injuries from which he afterwards died. The accident occurred about 18 miles out of Roanoke and within an hour and a half after the train being pulled by the engine which exploded had left Roanoke. The plaintiff in her declaration alleged that the defendant was guilty of negligence in the following respects:

(1) That the stay-bolts supporting the crown-sheet were made

of defective material, by faulty workmanship and had been weakened and rendered unsafe by having previously been burned;

(2) That the injectors which supplied water to the boiler were defective and out of order;

(3) That the glass water-guage was out of repair and in an unsafe condition, the valves thereon being stopped up with lime, trash or other deposits so that it improperly registered the quantity of water in the boiler;

(4) That the fire-box of said engine was not made sufficiently strong to withstand the force of an explosion caused by the giving away of the crown-sheet.

A demurrer was sustained to the fourth ground of negligence charged and the Court instructed the jury, without objection on the part of the plaintiff, that the evidence was insufficient to sustain the second ground of negligence charged. The case was therefore submitted to the jury on the first and third grounds of negligence alleged in the plaintiff's declaration. Your petitioner defended the case on the theory that the accident was caused by Engineer Andrews allowing water to become so low in his boiler that the crown-sheet was heated, by not having any water on top of it, to such an extent as to soften the material of which the crown-sheet and the stay-bolts supporting it were made and that they were thereby so weakened that they could not withstand the steam pressure in the boiler. The evidence showed that this engine was constructed by the Baldwin Locomotive Works, the largest and one of the best, if not the best, locomotive builders in the world. The engine was practically new, having been put in service in May or June, 1912. In the construction of this engine extreme care was used in the selection of the material and in the inspection of the work thereon. The specifications were such that the crown-sheet of the engine would have a factor of safety of 13.3 for a steam pressure of 200 pounds. The engine was being operated with a steam pressure of 185 pounds and was therefore able to withstand a pressure of about sixteen times the pressure of the steam at the time of the accident. In order to see that the specifications were complied with and that proper materials were used in the construction of this engine, your petitioner sent inspectors to the Baldwin Locomotive Works to test the material and look after the construction of the engine, who remained there until the engine was completed. The materials of which the crown-sheet and stay-bolts

were made were tested before they were put into the engine and found to be of the required tensil strength. After the completion of the engine, the boiler was tested with both a water and a steam test and was found to be satisfactory. After this explosion occurred, some of the stay-bolt material that was in this engine was taken to the Baldwin Locomotive Works and there tested and found to be of the required strength. The engine had been run by Engineer Andrews practically all the time since it had been put in service. On November 11, 1912, three days prior to the accident, the engine was inspected as required under the Federal Boiler Inspection Act. This inspection showed that the engine and all of its appliances were in perfect condition. The engine was not operated by anyone except Engineer Andrews from that time until the explosion occurred. He had made with it one trip from Princeton to Roanoke and return and then had run the engine back to Roanoke and was making the return trip to Princeton when the boiler exploded. After the explosion, the engine was hauled to Princeton by another engine. The cab of it was boxed up so no one could interfere with it or any of its appliances until the inspectors sent out by the Interstate Commerce Commission in cases of explosion, had arrived to make their inspection. On the 16th and 17th of November, two inspectors sent out by the Interstate Commerce Commission made a thorough inspection of this engine and pronounced the condition of the boiler and all of its appliances to be perfect. Both of said inspectors testified in this case that the engine aside from the injury caused by the explosion was in perfect condition and that the explosion in their judgment was unquestionably due to low water in the engine at the time the explosion occurred. In addition to the inspection made by the government inspectors, a number of other people with wide experience in the inspection of crown-sheets blown down on account of low water inspected the boiler, and all of them reached the conclusion that the explosion unquestionably occurred from low water in the boiler. The witnesses for both the plaintiff and your petitioner, all stated that the crown-sheet which was produced in evidence showed that it had been burned; that is, heated under pressure with no water on top of it; and that the burned area was from 3½ to 4 feet wide and from 4 to 5 feet in length. This burned area was shown by the pockets or convolutions between the stay-bolts supporting the crown-sheet. The stay-bolts were located four inches apart from center to center. The crown-sheet had bags or pockets in it between the stay-bolts which amounted to as much as ⅛ to ¼ of an inch. The plaintiff's expert witnesses testified that the color of the crown-sheet indicated that it

had been burned prior to the time of failure and that it had water on it at the time it actually failed. They were unable to say how long prior to the failure this burning occurred and said that it might have occurred a half hour before the failure or that it might have occurred at some previous time.

To prove her case, the plaintiff relied mainly on two expert witnesses and the fireman who was firing the engine at the time of the accident. The expert witnesses were one L. S. Randolph, who is professor of mechanical engineering at the Virginia Polytechnic Institute at Blacksburg, and one Arthur Scrivener, who claims to be a power plant engineer and who claims to have had some experience with stationary boilers, but was shown to have had practically no experience with locomotive boilers. These two expert engineers advanced many theories as to how an explosion of this kind might have happened, which will be discussed at length in another connection, and the only expert opinions they gave that in any way tend to support the plaintiff's theory in this case is that the color and appearance of the crown-sheet at the time of the trial indicated that the burning occurred prior to the explosion and that the crown-sheet had water on top of it when it failed. The fireman, Jerry Walton, testified that the water-glass indicated that the engine had water in it at Singer, a point about two and a half miles east of where the accident occurred; that the right injector was working continuously from the time they left Roanoke, and that ordinarily one injector is sufficient to keep the boiler supplied with water. He further testified that he did not see the crown-sheet red hot at any time on that trip and that he did not notice any difference in the light in the fire-box. His testimony on cross-examination showed that he could not see the crown-sheet in firing the engine and that he did not in fact see the crown-sheet from the time the train left Roanoke.

This suit was brought under the Federal Employers' Liability Act and was based on the Act of Congress of February 17, 1911, requiring railroads to equip their locomotives with safe and suitable boilers and appurtenances thereto. The trial resulted in a verdict and judgment in favor of the plaintiff for $20,000.00.

ASSIGNMENTS OF ERROR.

Your petitioner assigns the following errors:

(1) The court erred in overruling your petitioner's motion to

set aside the verdict as contrary to the law and the evidence.

(2) The court erred in giving instructions offered by the plaintiff.

(3) The court erred in refusing to give instructions offered by your petitioner.

(4) The court erred in admitting improper evidence offered by the plaintiff.

(5) The court erred in excluding proper evidence offered by your petitioner.

(6) The court erred in refusing to set aside the verdict on the ground that the damages allowed were excessive.

(7) The court below had no jurisdiction to try this case on the ground that a trial by a jury of seven is not the kind of trial provided for under the Employers' Liability Act, being in violation of the seventh amendment to the Federal Constitution.

These assignments of error will be considered in the order above set out.

I. The court should have set aside the verdict as being contrary to the law and the evidence on the ground that there was not sufficient evidence to support a verdict in favor of the plaintiff.

This action, as above stated, was brought under the Federal Employers' Liability Act. The act was not intended to affect existing rules as to negligence, the proximate cause of the accident or the causal relation that must exist between the negligent act and the injury complained of. It was only intended to abolish and modify certain grounds of defense in negligence cases. The fellow servant doctrine is abolished; the rule as to contributory negligence is modified in that it is abolished where a statute for the safety of employees is violated, and in other cases the rule of comparative negligence is introduced. The doctrine of the assumption of risks is abolished where a statute for the safety of employees has been violated.

Seabord Air Line v. Horton, 233 U. S. 492-58 L. Ed. 1062.

Mondou v. New York, etc., Rwy. Co., 223 U. S. 156 L. Ed. 327-346.

The act requiring railroad companies to equip their locomotives with safe and suitable boilers and appurtenances does not change the

burden of proof as to the particular defect alleged to have caused the accident. Under this act the railroad companies are made responsible where a defect is shown to exist, from which an accident resulted, and the liability is absolute in that the railroad company cannot show that due diligence was exercised in order to discover the defect.

This act does not relieve the plaintiff from showing the existence of the defect from which an absolute inference of negligence arises as above stated, but the burden is on the plaintiff to show by sufficient and satisfactory evidence the existence of the defect. The court below recognized this principle in its instructions to the jury, but allowed the plaintiff, instead of proving negligence, to embark in a field of speculation as to how the accident might have been caused otherwise than by an explosion from low water as claimed by the defendant. In other words, the plaintiff, in introducing her evidence, and the court in permitting evidence to be introduced over the objection of the defendant, proceeded on the theory that the burden was on the defendant to explain how and why the explosion occurred instead of being on the plaintiff to show some fact or facts from which it could be determined how and why the crown sheet failed.

The principle is that the plaintiff must show affirmatively the negligence relied upon, and applying this principle to the case in hand, the burden was on the plaintiff to show affirmatively the defects which existed in the boiler and caused the explosion. In order to carry this burden, the plaintiff must produce reliable and substantial evidence tending to show the alleged defects. The principle is nowhere better settled than in Virginia that the existence of negligence cannot be left entirely to conjecture, and that pure speculation as to the causes of an accident does not meet the requirements as to proof of negligence.

N. & W. Rwy. Co. v. Cromer, 101 Va. 667-671.
Consumers Brewing Co. v. Doyle, 102 Va. 399-402.
Northington v. Norfolk Rwy. Co., 102 Va. 446.
N. & W. Rwy. Co. v. McDonald, 160 Va. 207-212.
Baugher v. Harman, 110 Va. 316-319.
Steele v. Colonial Coal Co., 115 Va. 385-388.

Tested by these principles, the plaintiff's evidence utterly fails to establish the existence of the alleged defects in the boiler and the consequent negligence of the defendant.

The case was submitted to the jury on two theories as to the defendant's negligence. One was that the crown-sheet failed on account

of defective materials or improper workmanship, or had been previously burned in service. The other was that the water glass guage was out of order and erroneously indicated the quantity of water in the boiler. It will be observed that these theories are directly opposed to each other, one being based on the idea that the crown-sheet failed on account of defects therein when it was covered with water, and the other being based on the idea that Engineer Andrews was misled by the false indication of water shown by the water glass, and allowed the crown-sheet to become uncovered and to be burned by reason of the defect in the water glass.

If the evidence was sufficient to support either one of these theories, it would absolutely refute the other. The evidence as to both is purely speculative, and the fact that two opposing theories of this kind were relied on shows conclusively that there was no certain and reliable evidence as to the existence of the facts upon which either theory was based. The reliance upon these two theories makes it absolutely uncertain and purely conjectural as to what caused the explosion.

To support the first theory that the explosion occurred on account of defects in the crown-sheet or stay-bolts, the plaintiff relied on the following facts:

The fireman, Jerry Walton, testified that the water glass guage showed water in the boiler from the time the engine left Roanoke until it arrived at Singer, a distance of two and a half miles east of the point where the accident occurred; that he did not look at the water glass again between Singer and the point where the explosion occurred. He also testified that the right injector was working from the time they left Roanoke until the explosion occurred; that one injector will supply a sufficient quantity of water to the boiler, and that he could tell from the sound of the injector that water was being thrown into the boiler. These engines are equipped with two injectors for forcing water from the tank into the boiler, one injector being located on the right side of the cab and one on the left side of the cab, both injectors being located outside of and under the cab, and the pipes leading therefrom into the boilers being entirely outside of the cab. This witness further testified that in firing the engine he did not see the crown-sheet red hot at any time and did not notice any difference in the glow or light in the fire box.

The witness, Arthur Scrivenor, testified that the appearance of the crown-sheet which was produced at the trial did not necessarily

show that it failed from low water, and that from its appearance the explosion might have been caused by low water or from other causes. He also testified that the crown sheet did not appear to have been heated white hot, and that if it had been heated only to a dull red heat, that first-class stay-bolts at that heat should have been able to withstand the boiler pressure. He said that he had had no practical experience in regard to such matters, and that his opinion was based on figures which he had obtained from Kent and other technical books.

The witness, Randolph, said that he saw no indication that the sheet went down with an absence of water from the top of it. He did not think from the appearance of the sheet that it was heated at the time of the explosion beyond a dark red heat, and that good bolts should stand the pressure of the steam in the boiler when heated to a dark or bright red heat. This witness expressed the opinion that the crown-sheet had water on it at the time of failure and said that the color of the sheet was the principal, if not the only, reason he had for saying that the sheet had water on it when it failed. He testified that the sheet had been burned; that is, heated under pressure with no water on it, over an area of 3¼ to 3½ feet wide, and about 4½ feet long. He could not say when it had been burned, and said that the burning may have occurred one-half or three-quarters of an hour before the failure, or at any time previous to that time.

If every fact testified to by these witnesses is treated as being established, such facts absolutely fail to show what caused the explosion. If Jerry Walton, the fireman, observed the water glass guage closely enough to be able to say that the boiler had water in it and over the crown-sheet from the time it left Roanoke until it reached Singer, he did not look at it after passing that point; and it was shown by the evidence of an engineer who ha' several times tried the experiment with this class of engine that as much water as Jerry Walton said was in the boiler at Singer could be exhausted before reaching the point of the accident.

It was also shown by every experienced engineer who testified in the case that although the injector may be working it may not be supplying any water, or a sufficient quantity of water to the boiler. If the valves admitting water and steam to the injector are not properly adjusted, the water will go out through the waste pipe and will not be forced into the boiler. The fact that Jerry Walton did not see the crown-sheet red hot or did not notice any difference in the light in the fire box, does not show that the crown-sheet was not

burned on that trip. If he could have seen the crown-sheet in firing the engine, he does not claim to have been firing the engine constantly from the time it left Roanoke, and the crown-sheet could have been burned at a time when he was not firing the engine. His own evidence, however, shows conclusively that he did not see the crown-sheet, or make any effort to see it on that trip.

The opinions of Scrivenor and Randolph as to what strain the stay-bolts would stand if heated to a certain temperature throws no light on the cause of the explosion, because, according to the testimony of Randolph, the color of the sheet indicated the degree of heat at the time of failure, and if the sheet had previously been heated to a higher temperature and the sheet had then been covered with water and the engine operated, the color of the sheet caused by this higher temperature would have been obliterated by covering the sheet with water and operating the engine. Under this theory as to the color of the sheet, it might have been burned by Engineer Andrews on this trip any time previous to half an hours before the time of the explosion, and so weakened or injured that it failed with water on top of it at the time of the explosion.

It is entirely consistent with the facts testified to by these witnesses that Engineer Andrews may have burned the crown-sheet of this engine at some time after he left Roanoke with it, and in this way caused the explosion which resulted in his death. It certainly does not appear from the facts proved by these witnesses that the crown-sheet failed on account of defects in the engine or appliances for which the defendant is responsible. The evidence utterly fails to show any fact or facts from which it can be determined how and why the explosion occurred.

To support the theory that there was a defect in the water glass guage, and that Engineer Andrews was misled by the water glass guage into allowing the crown-sheet of his engine to become uncovered and burned, the plaintiff relied upon the evidence of Jerry Walton to the effect that the water glass guage indicated a sufficient quantity of water in the boiler from Roanoke to Singer, and upon the evidence of Randolph to the effect that if the water glass guage had been all right when Andrews took charge of the engine at Roanoke, that it could not have become stopped up by deposits of lime and salts between that time and the time of the explosion.

The testimony of all the witnesses was to the effect that an engineer can tell whether his water glass guage is stopped up or not by

the movement of the water in the water glass guage. It was the duty of Engineer Andrews, under the rules of the Company, to inspect his water glass guage before leaving Roanoke. If it was stopped up when he took charge of the engine, or became stopped up at any time on the trip by other means than the deposit of lime and salts, he had the means at hand of removing the obstructions by blowing it out, as the testimony shows can be readily done. In addition to this, the engine was equipped with guage cocks, which all of the witnesses testify afford the most certain and satisfactory means of testing the quantity of water in the boiler. The engine was entirely safe to operate and could have been operated indefinitely without a water glass guage by using the guage cocks.

The plaintiff's evidence not only fails to show any defect in the water glass guage, but on the contrary shows that if there was a defect in the water glass guage that Andrews was responsible for it, and responsible for relying on the water glass guage in a defective condition.

To meet the plaintiff's theory that the engine failed on account of defects in the crown-sheet or stay-bolts, the defendant showed that the engine was constructed according to the latest and most approved plans of boiler construction by locomotive builders of the highest reputation; that the crown-sheet was designed to stand a pressure of about sixteen times as great as the pressure exerted on it at the time of the failure; that it was constructed according to the specifications; that the materials used in its construction were the best obtainable, and that great care was used in the selection of the materials and the construction of the engine. Before the engine was put in service its boiler was thoroughly tested by steam pressure and by water pressure considerably higher than the pressure under which the crown-sheet failed. The engine had only been in service about five months, during which time it was in charge of Engineer Andrews except when he laid off for sickness or other causes. Three days prior to the accident, the monthly inspection required by the Federal Boiler Inspection Act was made of the boiler and all of its appliances, and they were found to be in perfect condition. After this inspection, the engine was handled exclusively by Engineer Andrews, and under the rules of the Company he was required to inspect it at the beginning and at the end of each trip and see that it was in good condition, and no other person was charged with the duty of making such inspection.

Just before the engine was turned over to Engineer Andrews on

the night of the accident, the crown-sheet was carefully examined by the hostler, who delivered the engine to him, and no defects in the crown-sheet were discovered. After Engineer Andrews took charge of the engine and before leaving Roanoke, he is shown to have made an inspection of the crown-sheet by the testimony of the conductor in charge of the train, and he presumably discovered no defects therein. When he arrived in Roanoke from Princeton, West Virginia, on the morning of the day the accident occurred, Engineer Andrews filed a written report certifying that he had carefully inspected this engine and all of its appliances, and he did not report any defect in the crown-sheet. Even the plaintiff's expert witness, Randolph, says (record p. 188) that he never saw a crown-sheet scorched as badly as this one that did not leak unless the spaces were filled up with something, and that any man who knew anything about the inspection of a boiler could have seen that the crown-sheet was burned if he had looked at it, and that a careful man could have seen the leaks from the crown-sheet if it was burned (record p. 861).

The defendant's evidence further showed that after the explosion the engine and its appurtenances were carefully inspected by two expert inspectors of the Interstate Commerce Commission, as well as by other disinterested persons skilled in such matters, and that all of them were of the opinion that it clearly failed from the absence of water on the crown sheet at the time of the explosion. The fact that this crown-sheet had been burned over a considerable area at the time of or prior to the explosion is established by the testimony of all the witnesses.

The testimony above referred to further establishes conclusively that if it had been burned before the government inspection of November 11, 1912, that it would have been discovered, that Andrews was from that time until the time of the explosion responsible for its inspection, and that if it had been burned prior to the time Andrews started with it on his run on the night of the accident, that either he or the hostler who delivered the engine to him at Roanoke would have discovered it. It further appears that if the engine was burned at any time after November 11, 1912, that Andrews was responsible for it as he was the only one who had run the engine.

The testimony shows that a crown-sheet burned to the extent that this one was will leak unless something is done to it to stop the leakage. There was no evidence to show that anything was done to this crown-sheet to stop the leakage after it was burned. The defendant's witnesses testified that a crown-sheet burned to the extent that

this one was would leak to such an extent that the fire in the fire box would be put out and that the engine could not be operated.

The extent to which a burned crown-sheet would leak was practically demonstrated by the use of an iron drum constructed as the crown-sheet of an engine is constructed. This drum was heated without water in it under pressure sufficient to bulge the sheet between the stay-bolt holes one-sixteenth of an inch. The pocketing of this sheet forming the end of the drum was not sufficient for the plaintiff's expert witness, Randolph, to detect it with his eyes, and as he expressed it, was burned less than the crown-sheet which failed. When water was placed in the drum under pressure, the photographs filed as exhibits and made a part of the record show the extent to which said drum leaked after it had been burned with water in it under pressure. The photographs show that the water runs out in streams around each of the stay-bolt heads.

Some of the plaintiff's witnesses claimed that a burned crown-sheet would leak less than was claimed by defendant's witnesses, and that after the boiler gets hot the leaks will take up to some extent, but none of them claimed that there would not be sufficient leakage in a crown-sheet burned as badly as this one was for the burning to be detected. As already stated, the witness, Randolph, says (record p. 861) that a careful man could have seen the leaks from this crown-sheet after it was burned.

The fact is, therefore, conclusively established that this crown-sheet was burned after Andrews took charge of the engine at Roanoke; otherwise, either he or the witness, Neece, the hostler, who turned the engine over to him, would have discovered that it was burned when they examined it.

The theory that the crown sheet was not burned by Andrews at the time of the failure, and that at the time of failure it had water on it, is based entirely on the testimony of the expert witness, Randolph. This witness testified (record pp. 197-198) that his principal, if not his only reason, for saying that the sheet had water on it when it failed was the color of the sheet at the time he examined it. The testimony of several of the defendant's witnesses was to the effect that the color of iron heated to an intense degree of heat changes materially by the lapse of time. The bright red oxide produced on iron by intense heat by exposure to atmospheric conditions is almost, if not entirely, removed and obliterated. The witness, Randolph, did not see the crown-sheet, or any of the stay-bolts until considerably over a

year after the accident, and when he was testifying about the color and appearance of the sheet, as shown by the record, it was nearly two years after the accident. In addition to this, his own admissions are sufficient to show that his theories and opinions are without foundation and utterly unreliable. When he was on the witness stand, he was shown a number of stay-bolt heads that were picked up in the fire box of the engine after the explosion. He admitted (record p. 878) that when he had previously testified in this case, and the same bolt heads were shown him, that he said "these bolt heads indicate that they have been hot, and that they failed from being hot because they were broken largely where the heat is greatest down in the head".

The character of the testimony of this witness can best be illustrated by reference to his testimony on this point. By reference to pages 876 to 880, it will be found that he first testified that the way the bolt-heads were broken down into the head might or might not indicate that they were broken when hot. When confronted with his statements at the previous trial, he attempted to reconcile his conflicting statements by saying that the color of the bolt-heads was an element that entered into his conclusion that they were broken while hot. He was finally forced to admit that the way the bolt-heads were broken down into the head was one indication that they were broken while hot, and that their color was another indication that they were broken while hot. The fact that the bolt-heads could not have been sufficiently hot to break down into the heads as they did with water on top of the crown-sheet is not controverted, and shows conclusively that at the time these bolt-heads were broken, whether before or at the time of the explosion, there was no water on the crown-sheet.

The witness, Randolph, admits (record pp. 168-178-179) that the convex shape of that portion of the bolt-heads resting against the crown-sheet was caused by the crown-sheet forcing them into that shape at some time before they were broken off. In other words, the contour of the bottom part of the crown-sheet was the same as the contour of the bolt-heads resting against it. The crown-sheet was forced down or bagged between the stay-bolts sufficiently to force the bolt-heads in this shape.

The extent to which the crown-sheet was bagged and the appearance it presented is shown by an exhibit made a part of the record. This exhibit is drawn to a scale representing the actual distances between the stay-bolts, and the portion of the crown-sheet shown in gray is its normal shape or position, and the portion of the crown-

sheet shown in red is the shape reproduced from actual measurements of the bolt-heads that the crown-sheet assumed in order to force the bolt-heads in the shape they were, when picked up in the fire box after the explosion.

The witness, Randolph, admits that the crown-sheet was bagged under pressure with no water on top of it (record p. 165), and that the bagging before the sheet was torn loose from the stay-bolts and forced down a distance of 10¾ inches was greater than the sheet showed after the explosion. He further admits that the sheet offered in evidence showed that it had been seriously injured by heat (record p. 193).

This witness says (record pp. 157-158) that where the stay-bolts are good and the strain is great enough to break them, it has a characteristic effect on the crown-sheet by leaving the depression around the stay-bolt holes made in the sheet by the heads of the stay-bolts, and that this characteristic effect appears on the crown-sheet in question.

The crown sheet showed that the threads in the stay-bolt holes were practically all in a perfect condition. The evidence showed conclusively that the threads on the ends of the stay-bolts, which were screwed into the crown-sheet, were not stripped. If the failure had occurred when the sheet was cold—that is, with water on top of it—the threads would have been stripped, and the witness, Randolph, admits (record pp. 185-186) that the threads would either have been stripped on the crown-sheet or on the stay-bolts. This shows conclusively that at the time of failure the portion of the sheet which failed was so much stretched from being hot, that the stay-bolt holes in the crown-sheet were opened to such an extent that the threads were separated, and the necessary conclusion is that the sheet was hot when the explosion occurred. Notwithstanding the witness, Randolph's, theory that the crown-sheet had water on it at the time it failed, he admits that he never in his experience knew a crown-sheet to be blown down when the top of it was covered with water (record pp. 190-191 and 208-209).

These facts, which were established by uncontradicted testimony, and the admissions of the expert witness, Randolph, show that the theory of the witness, Randolph, that the sheet failed when it was covered with water is not supported by the evidence. The above references to his testimony further show that in many respects his testimony and theories are inconsistent and contradictory, and that his

testimony, therefore, cannot be considered trustworthy and reliable.

The conditions which were found to exist after the happening of this accident show that the water was low and the crown-sheet was burned at the time of the explosion.

The engineer's position is on the right side of the cab. The fireman and the front brakeman, who usually rides in the cab, occupied the seat on the left side of the cab. The valves operating the left injector have to be manipulated on the left side of the cab. The ordinary practice of engineers is where there is not an emergency, and where it is not necessary to get water into the boiler quickly, to require the fireman to turn on the left injector, but where the water is low, and it is not safe to trust the fireman to turn on the left injector, the engineer performs that service himself. Just before the explosion, Jerry Walton says that the brakeman was sitting on the seat-box on the left side and that he had his knees on the rear end of the left seat-box leaning out of the window. In the position the front brakeman was sitting, he would have to move out of the way in order to allow the engineer to manipulate the valves to turn on the left injector. Ordinarily only one injector is used, and the witness, Walton, testifies that only the right injector had been used on that trip. After the explosion the left injector was found turned on. Andrews was blown out on the left side of the cab. The brakeman was blown out on the right side of the cab. The steam which escaped from the exploded boiler and blew the engineer, fireman and brakeman out of the cab came out of the fire box into the cab through the fire box door, which is located in the center of the cab. It is impossible to conceive how Andrews and the brakeman could have been blown across and out of the cab on opposite sides from which they were sitting by this escaping steam. The necessary conclusion from these circumstances is that Andrews had discovered that his water was low and went to the left side of the cab to turn on the left injector, requiring the brakeman to move out of the way to the right side of the cab, and that while they were in this position the explosion occurred, blowing Andrews out on the left of the track, the brakeman on the right side of the track, and the fireman, Walton, through the window on the left side, out of which he was looking.

The defendant's evidence in regard to the alleged ground of negligence that the water glass guage was out of order showed that this water glass guage was examined by the hostler, Neece, before turning the engine over to Andrews, and was found to be in good condition.

After the accident it was tested by the two Interstate Commerce Commission inspectors, and others, who testified that it was in perfect condition and correctly registered water in the boiler. The evidence not only fails to show any defect in the water glass guage, but conclusively establishes that it was in perfect condition.

From the foregoing, it appears that the plaintiff's evidence fails to establish either of the grounds of negligence relied on. It is purely conjectural and speculative, and the most that can be said of it is that it shows that the cause of the explosion is uncertain, and it establishes no fact or facts from which the cause of the explosion can be determined. The defendant's evidence, on the other hand, shows that the explosion must have resulted from a cause for which Engineer Andrews was responsible. The verdict of the jury should, therefore, have been set aside on the ground that it was not supported by the evidence.

The defendant showed by an overwhelming preponderance of trustworthy and reliable testimony that the crown-sheet failed from low water at the time of the explosion, but as the evidence must be considered as on a demurrer to the evidence, this testimony has not been discussed in detail. Only such evidence has been referred to in detail as when considered under this rule, shows that the plaintiff has failed to prove by reliable and substantial evidence the facts necessary to support a verdict in her favor.

II. The second assignment of error is that the court erred in giving instructions offered by the plaintiff.

Instruction No. 1 given for the plaintiff over the objection of the defendant tells the jury that if they believe from the evidence (1) that the stay-bolts had been burned in service and were weak and unsafe; (2) that the stay-bolts had become broken and were weak and unsafe; (3) that the stay-bolts were improperly screwed in and improperly adjusted in construction, and (4) that the stay-bolts were constructed of defective and faulty material, and that the accident resulted solely from any of said causes, they should find for the plaintiff.

Under the first branch of this instruction there is no limit placed on the time when said stay-bolts were burned in service, or how or by whom they might have been burned in service. If the stay-bolts had been burned in service, and were rendered weak and unsafe by Engineer Andrews at any time on that trip, or at any previous time, the

jury were told to find a verdict for the plaintiff. This branch of the instruction is directly in conflict with defendant's Instruction No. 2, which told the jury that if the crown-sheet was burned and rendered unsafe by Andrews after he took charge of the engine on November 14, 1912, the plaintiff could not recover.

That the giving of conflicting instructions is error is so well established as not to require the citation of authority.

There was no evidence justifying the second branch of this instruction, to-wit: that if the stay-bolts had become broken and were, therefore, weak and unsafe, the jury should find for the plaintiff. There was no evidence tending to show that the stay-bolts had become broken and were, therefore, weak and unsafe. The plaintiff's witness, Randolph, was allowed to speculate as to the different ways in which stay-bolts might be rendered unsafe. He testified that they might be weakened by a prior burning. There was no evidence of a prior burning, and if there had been a prior burning, the evidence showed that Andrews was responsible for it. He testified that motion between the top sheet to which these stay-bolts are attached at the top, and the crown-sheet to which they are attached at the bottom, might result in weakening the bolts. His opinion, however, was that it would take a long time for this to happen, and that it would only weaken short bolts, whereas these bolts were long bolts.

The witness Scrivenor advanced the theory that bolts might be weakened by cold draughts of air from the fire box being left open. There was no evidence that the fire box door had been left open, or had been opened at all, except when necessary to fire the engine, and there was absolutely no foundation for this theory.

This branch of the instruction is subject to the further objection that if the stay-bolts had become broken, and were, therefore, weak and unsafe through the fault of Andrews himself, the jury were told that the plaintiff was entitled to recover, which is in conflict with defendant's instruction No. 2, and was improper for that reason.

The third branch of the instruction was objectionable for the same reasons that the second branch was objectionable. There was no sufficient evidence to support the third branch of this instruction. It is true that Randolph testified that, if when said stay-bolts were screwed in, they were not set at right angles to the sheet, they might be injured by one side of the head of the bolt coming in contact with the sheet before the other side of the head came in contact with it,

and that when the bolts were screwed up so as to make a tight fit, it would result in straining one side of the bolts, and that, consequently, the use of a seating tool was an advisable, though not a necessary, practice.

There was no evidence that these bolts were not properly adjusted when they were screwed in, and that the use of a seating tool was required. Witness Randolph further testified that bolts are sometimes weakened by being screwed in without nicks in the head, and that some of the bolts which were produced did not show signs of being nicked in the head. He stated, however, that, if the heads were not twisted off, the heat in the fire box would cause the heads to slough off in a much shorter time than this engine had been in operation, and he finally admitted that any signs of nicks in the heads would in some cases be obliterated by the action of the fire in the fire box (record, pages 871-2-3).

The defendant's evidence, on the contrary, showed by actual experiment with stay-bolts made from the stay-bolts of this engine, that the bolts could not be injured in this way, because the threads of the bolts would strip off before they could be screwed in tight enough to injure the bolts. The defendant's evidence very positively showed that the heads of the bolts of this engine were nicked in a machine before they were screwed in.

The fourth branch of the instruction, that the stay-bolts were constructed of defective and faulty material is absolutely without evidence to support it. The plaintiff produced no evidence to show that defective or faulty material was used in the construction of these bolts. On the other hand, the defendant showed conclusively, by tests of the material before it went into the engine, and tests of the stay-bolts found in the engine after the explosion, that the material was not defective or faulty but was first-class in every particular.

The plaintiff's Instruction No. 2 was to the effect that, if the water glass guage was out of repair and in an unsafe condition, due to the valves being stopped up by lime or other deposits, and incorrectly indicated the water in the boiler, and that Andrews relied on the water glass guage, and that the accident resulted therefrom, they must find for the plaintiff.

In the discussion of Assignment of Error No. 1 it has already been shown that there was absolutely no evidence to support this instruction. If there had been evidence to support it, it was erroneous, because it left out of consideration Andrews' negligence in al-

lowing the valves to become stopped up, and in relying upon the water glass guage when he knew that it was out of order, and had other means of determining whether he had a sufficient quantity of water in the boiler or not. That it is error to give instructions not supported by the evidence is well established by Virginia authorities.

C. & O. Ry. Co. vs. Stock, 104 Va., 108.
C. & O. Ry. Co. vs. Ghee, 110 Va., 527.
American Locomotive Co. vs. Whitlock, 109 Va., 238.
N. & W. Ry. Co. vs. Stegall, 107 Va., 231.

The second instruction is wrong, because, if the water glass guage was out of order, Andrews would have known it (record, p. 457), and it was negligence on the part of Andrews to rely on it when it was out of order. The engine was safe to operate without the water glass guage. It was not negligence on the part of the defendant not to provide a water glass guage, or to use the engine, if it was out of order.

Moore Lime Co. vs. Johnston, 103 Va., 84-86.
Piedmont, etc., Co. vs. Patterson, 84 Va., 747.

Both of these instructions directed a verdict for the plaintiff, and left out of consideration entirely the contributory negligence of the plaintiff's intestate. If the defendant's engine was defective in either of the particulars claimed, the evidence clearly shows that Andrews was either responsible for the defect, or that he was guilty of negligence in inspecting the engine and not discovering the defect. If he was guilty of negligence which in either of these ways contributed to his injury, the jury should have been told, as provided for in the Employers' Liability Act, that the amount of recovery should be diminished in proportion to his negligence. Both of these instructions told the jury that they should find for the plaintiff, and by plaintiff's Instruction No. 3 they are told that they should find for the plaintiff the full amount of the damages sustained.

That it was error to give these three instructions without any reference to the contributory negligence of the plaintiff's intestate, and without telling the jury that the damages should be reduced in proportion to such contributory negligence, is too plain to require any further argument.

C. & O. Ry. Co. vs. Sparrow, 98 Va., 630.
N. & W. Ry. Co. vs. Earnest, 229 U. S., 114; 57 Lawyers' Ed., 1096.
Illinois Central R. R. Co. vs. Nelson, 203 Fed., 956.

The second instruction was erroneous for the further reason that it appears from the evidence that two appliances were provided for showing the quantity of water in the boiler; that, if the water glass guage gets out of order, the engineer would know it at once: that the guage-cocks afford the most certain way of determining the quantity of water in the boiler, and if the water glass guage was out of order, it was entirely safe to operate the engine by using the guage-cocks to show the quantity of water in the boiler.

Under the Federal Act requiring railroad companies to furnish safe and suitable boilers and appliances, it is provided that the boiler and appurtenances must be safe to operate without unnecessary peril to life or limb. That a boiler provided with guage-cocks and without any water glass, or with a defective water glass, is safe to operate without unnecessary peril to life or limb is conclusively shown by the evidence. It was, therefore, error to base an instruction on a theory that the water glass being defective or out of order rendered the engine unsafe to operate. Where two appliances are furnished for the same purpose, and the engineer may use either at his election, it is not negligence to permit the engine to be used in service, if one of these appliances happens to be defective or out of order.

Moore Lime Co. vs. Johnston, 103 Va., 86.

If it can be said that the plaintiff's evidence furnished a sufficient foundation for an inference of negligence against the defendant, on either of the alleged grounds of negligence covered by the first two instructions, the evidence conclusively shows that Andrews himself was guilty of negligence. That the crown-sheet was burned at some time is conclusively established. Engineer Andrews was responsible either for burning it, or for failing to inspect it properly and discover that it was burned. The same is true of the water glass guage. If it was out of order, Engineer Andrews was responsible for letting it get out of order, or for not discovering that it was out of order, and it was his duty either to correct the defect, or to use the guage-cocks which were provided.

In any view that may be taken of the theories of negligence covered by these instructions, they were erroneous, either in that they were without evidence on which to base them, or they left entirely out of view the contributory negligence of Engineer Andrews.

III. The third assignment of error is to the ruling of the court in refusing to give instructions offered by the defendant.

Defendant's Instruction No. *A*, which was refused by the court, was to the effect that, if the crown-sheet of the engine was burned and rendered unsafe after the inspection of November 11th, 1912, and that Andrews was solely responsible for the said crown-sheet being burned, whether it occurred at the time of failure or prior thereto, after such inspection, the plaintiff cannot recover in this case.

This instruction was to the effect that Andrews should be held responsible for his own negligence, which was the sole cause of the accident. The rules of the company were introduced showing that the engineer was required to inspect his engine at the beginning and at the end of each trip. From the time of the inspection on November 11th, 1912, until the happening of the accident, the duty of inspecting this engine was placed solely upon Engineer Andrews (record, pp. 783-4). No one else had run this engine from the time of this inspection until the happening of the accident. If the engine was burned between the time of this inspection and the happening of the accident, Engineer Andrews was responsible for it, and the negligence of no one else could have intervened and contributed to his injury.

The court should, therefore, have given this instruction as it was offered; but the court refused to give this instruction as offered, but gave it as amended as Instruction No. 2, holding Engineer Andrews responsible for burning the crown-sheet and rendering it unsafe after the engine was delivered to him on the evening of November 14, 1912. It is hard to understand on what theory the court could hold him responsible for negligence which was the sole cause of the accident, which occurred after the engine was delivered to him on the evening of November 14, 1912, and not hold him responsible for negligence which was the sole cause of the accident, which occurred after November 11th, 1912, when the evidence fails to show that the negligence of any one else which contributed to the injury had intervened.

Instruction No. *B* offered by the defendant and refused by the court should have been given. The object of this instruction was to eliminate the other charges of negligence set out in the declaration, of which there was no proof whatever, and to tell the jury that as to the only elements of negligence of which there was any proof, the burden was on the plaintiff to show that some one other than Andrews himself had been guilty of negligence. This instruction embodies the simple proposition that the plaintiff must prove negligence, and that there is no burden on the defendant to explain the accident or to show that no one else was negligent. If some one other than Andrews had been

guilty of negligence, which contributed to the accident, the burden was on the plaintiff to prove such negligence, and it was not the duty of the defendant to show that no one else was guilty of negligence.

Instruction No. *C* which was offered by the defendant after Instruction *B* was refused, was the same as Instruction *B* except that it took into consideration the manner of screwing the stay-bolts into the crown-sheet. If Instruction B was improper on account of leaving out of consideration an element as to which it might be claimed there was some evidence, In struction *C* certainly covered the whole case and should have been given.

Instruction No. *D* offered by the defendant should have been given. It was to the effect that, if the duty to inspect this engine was imposed on Andrews alone after November 11th, 1914, and he failed to perform this duty, and the accident resulted from such failure, the plaintiff cannot recover.

As already shown, Engineer Andrews was alone responsible for the inspection of this engine and reporting defects therein, from the time of inspection on November 11th, 1912, until the accident occurred. If the accident resulted from his failure to properly perform this duty, then his failure in this regard was the proximate cause of the accident. It would seem self-evident that, if an engineer is given an engine in perfect condition, and the duty is imposed on him to inspect it and report defects therein, for a certain period, and he fails to properly inspect the engine, and as a consequence, injury results to him, he cannot recover.

IV. The fourth assignment of error is to the ruling of the court in admitting improper evidence offered by the plaintiff.

In all there were fifteen exceptions taken during the course of the trial to the rulings of the court in admitting improper testimony. Of these fifteen exceptions the third, fourth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth, thirteenth, fourteenth and nineteenth are so similar that they may be discussed together.

The principal objection to the evidence covered by all of these exceptions is that it was purely speculative and conjectural, and was not based on any facts proved in the case, and was not relevant to the issue involved in the case.

Under the principles established by the cases cited under the second assignment of error, the plaintiff in a case of this character

must prove his case by reliable and substantial evidence. It follows that evidence which is purely speculative and conjectural and not based upon any known or established facts is improper and should not be admitted.

The evidence of Jerry Walton, covered by Exception No. 3, is further objectionable on the ground that he was allowed to express an opinion to the effect that, if the crown-sheet had been heated red hot, he would have been bound to have seen it in firing the engine, when his testimony showed that he had had absolutely no experience with red hot crown-sheets, and that the facts upon which this opinion was based were not within his knowledge.

The same objection applies to the testimony of G. A. Richardson, embodied in Bill of Exceptions No. 4. This witness was allowed to express an opinion and say that, in his judgment, a hot crown-sheet would give a different light or glow in the fire box, when he had never seen a red-hot crown-sheet and had no experience or knowledge upon which to base such an opinion.

The evidence of the witness, Arthur Scrivenor, embodied in Exception No. 6, was objectionable for the same reason. This witness was allowed to express an opinion as to what the present appearance of the crown-sheet indicated, when he had no experience with burned crown-sheets, and no knowledge upon which such opinion was based.

The evidence embodied in Exception No. 7 is speculative and conjectural in the extreme. The witness was permitted to testify as to the effect sometimes produced upon crown-sheet bolts by cold draughts admitted by opening the fire box door. As already pointed out, there was no evidence of opening the fire-box door except for the necessary purpose of firing the engine, and if such draughts were admitted in the necessary firing of the engine, then certainly the defendant could not be held responsible for the effects thereof. As a matter of fact, the testimony in this case shows, as may be plainly seen from the exhibits, that a brick arch extends from the back of the fire box forward to within a few inches of the front of the fire box, which would prevent cold draughts from striking the crown-sheet. The object of this brick arch is to concentrate the heat on the bottom of the crown-sheet, and it is obvious that the crown-sheet would not be exposed to cold draughts with a hot fire in the fire box.

Exception No. 8 is to the testimony of L. S. Randolph to the effect that mud or oil left on a crown-sheet might cause it to burn with water on top of it.

There was absolutely no evidence to show that mud or oil was on this crown-sheet, and there was no foundation for the speculative theory advanced by this witness. On the contrary, the evidence showed that the crown-sheet was thoroughly cleaned before it was delivered by the Locomotive Works, and was washed out every ten days after it was put in service.

Exception No 9 is to the evidence of L. S. Randolph to the effect that it would not be possible for scale or lime salts to be deposited in the water glass so as to stop it up and cause it to register improperly, between the time the engine left Roanoke and the time the accident occurred. There was no evidence that the water glass was stopped up or registered improperly at any time. The speculative opinion of this witness was not based on any facts proved in the case.

The same is true of the evidence of this witness embodied in Exception No. 10. There was no evidence to the effect that in an engine constructed as this one was, that there would be any motion between the top sheet or "wagon top", and the crown-sheet, that would result in weakening the stay-bolt heads. The witness himself stated that such motion would not even weaken short bolts of a crown-sheet seriously, unless the engine was running a long time. This evidence in no way tended to show that the crown-sheet in question was blown out on account of the weakening of the stay-bolts in this manner, and the evidence should not have been admitted.

The same objections heretofore discussed are applicable to the testimony embodied in Exceptions No. 11 and No. 12.

Exception No. 14 is to the evidence which the court permitted to be brought out on cross-examination of defendant's witness, A. H. McGhee, to the effect that engine No. 473 had been inspected by him and reported in good condition; when, in fact, the crown-sheet had filings on it, which afterwards caused it to burn. The engine involved in this case was No. 469. Evidence of defects in other engines was improper, and if this evidence even tended to show the failure of this witness to properly inspect other engines, it was improper. To go into the question of the burning of the crown-sheet of engine No. 73 would raise collateral issues, and the fact that this witness failed to discover the filings on the sheet of engine No. 473 does not show that he did not properly inspect engine No. 469.

N. & W. Ry. Co. vs. Biggs, 103 Va., 110.

The evidence embodied in Exception No. 19 to the effect that

leaks in crown-sheets could be stopped by the use of saw-dust, bran or any fibrous material of that kind, was improper, because there was absolutely no evidence of the use of such materials for stopping the leaks in this crown-sheet, and no facts were proved from which an inference might arise that the leaks had been stopped by the use of such materials.

The foregoing exceptions show the manner in which the court below permitted this case to be tried. The plaintiff's counsel and expert witnesses were allowed to embark upon any field of speculation and conjecture that their imaginations could suggest. They were not restricted to proving facts from which it might be inferred how and why this accident happened, but were allowed to offer every speculative theory that they could think of, to show that it might have resulted from some other cause than low water in the engine.

Exception No. 5 is to the ruling of the court in allowing the witness Arthur Scrivenor to give his opinion as an expert witness as to the condition of the crown-sheet, and generally, as to his qualifications to testify as an expert.

The evidence of this witness shows that he had never had any experience in the construction or maintenance of locomotive boilers, and had never had any occasion to investigate the causes of boiler explosions; that his only experience with locomotives within the last twenty years was as a draftsman in the shops of the Richmond Locomotive Works, and that there he did not come in contact with the actual construction of the boilers; that since that time he had only been concerned with the up-keep of stationary boilers, and that the character of the boilers on locomotive engines has greatly changed since he had anything to do with them. It is true that he stated that he thought that he was competent to give an opinion on the subject; but the mere expression by the witness of his belief that he is an expert is not sufficient to qualify him as an expert. He must testify to some facts which show his skill and experience in the business as to which he is attempting to give an expert opinion, and must show that he is possessed of such knowledge or experience on the subject as qualify him to testify as an expert.

Commonwealth vs. Larkin, 88 Va., 422.

N. & W. Ry. Co. vs. Corletto, 100 Va., 355.

The whole testimony of this witness shows that he was not possessed of such knowledge on this subject as would entitle his opinion to any weight, and his opinion evidence should have been excluded.

Exception No. 13 is to the testimony of G. W. Mitchell as to the expectancy of Andrews' life. This witness gave the expectancy from what he called the American Experience Tables of Mortality, which tables he testified were made up by the Life Insurance Companies from the experience of those companies as to the life of the average man. He further testified that the occupation of a railroad engineer is more hazardous than that of an ordinary man, so much more so that insurance companies would not insure the lives of such engineers, except under a special form of policy taking higher rates than those of the ordinary man.

The plaintiff testified that her intestate was not a man in ordinary good health; that he was frequently sick and had to lay off from his run on that account.

While we are aware that this Court has in other cases held that the expectancy as determined by such tables is admissible evidence, we respectfully submit that, where the evidence shows that the person whose life is the subject of investigation belongs to a different class from those included in the tables, and where he is following a hazardous occupation, such tables should not be admitted.

V. The firth assignment of error is as to the action of the court in excluding proper evidence offered by the defendant.

Exception No. 15 is as to the action of the court in sustaining the objection to the testimony of H. L. Thomas, that, if the engineer discovered that the water was so low as to endanger his crown-sheet, and wanted to put on the left injector of the engine quickly so as to avoid an explosion, he would perform this work himself, and not trust the fireman to do it. This evidence supports the defendant's theory that Andrews would have gone to the left side of the cab to put the left injector on, when he discovered that there was danger of an explosion. The evidence excluded is simply evidence of the common practice of engineers under the circumstances related, and was directly in support of the defendant's theory that the way Andrews happened to be blown out of the left side of the engine was due to the fact that he discovered his water was low and had gone to that side of the engine to put on the left injector. The witness was an experienced engineer and was well qualified to testify as to the practice of engineers under such circumstances.

Exception No. 16 is to the action of the court in sustaining the objection to the testimony of N. W. Sample as to the amount of the

pressure necessary to force the crown-sheet into the shape that it assumed after the explosion (it being bagged about ten and three-fourths inches), and that the pressure from one hundred and eighty-five pounds of steam could not have forced it into that shape when it was cold. The witness Randolph had testified that the ordinary working pressure to the engine, of one hundred and eighty-five pounds of steam, could force the sheet into that shape, if a dozen or so stay-bolts were broken. It was certainly proper to allow the defendant to rebut this evidence by showing by the witness Sample that it was necessary to use a great deal more pressure than one hundred and eighty-five pounds would exert in order to force a sheet of this strength into that shape when cold, and to show that it was necessary to use not a pressure of one hundred and eighty-five pounds to do this, but that a pressure of practically one thousand tons was necessary. The witness gave the source of his information, and the reasons for the opinion that he expressed. The court ruled the evidence out on the ground that it was evidence of an experiment. The evidence ruled out was not evidence of an experiment, but was evidence of the methods used for bending sheets of this character, from the observation of which the witness formed his opinion as to the amount of pressure necessary to bend the sheet in the way that this sheet was bent.

Exception No. 17 is to the action of the court in sustaining the objection of the plaintiff to the testimony of Doanberger, that certain bolts which were produced and shown to the jury were bolts taken from the Norfolk & Western engine blown up from low water at Alleghany Tunnel, and that these bolts broke like the bolts on engine No. 469 broke when it exploded. The witness Randolph had testified that he had seen the Norfolk & Western engine near Alleghany Tunnel, and that it had undoubtedly exploded from low water. He had also testified that certain bolts, which were also shown to the jury, and which came from engine No. 469, presented the appearance of having been broken cold.

The purpose of this evidence was to show the jury bolts which had admittedly come from an engine which had exploded from low water, and which had admittedly broken when hot, and allow them to compare these bolts with the bolts taken from engine 469, and to test for themselves the accuracy of Professor Randolph's opinions.

Exception No. 18 is to the action of the court in sustaining the

objection to the testimony of the witness Slayton, to the effect that it was the duty and the custom of engineers to inspect the water glass before starting on their runs.

One ground of negligence charged was that the water glass was defective. The written rule requiring the engineer to inspect the engine and all its appurtenances before, during and after each trip, had been introduced in evidence, and the testimony excluded was simply to show the application of that rule, and that the water glass was one of the appurtenances of the engine which the engineer was, under that rule, required to inspect, and that engineers did, in fact, always inspect the water glass before starting on a run. This evidence was pertinent, because, if Andrews had performed his duty by inspecting the water glass before starting on his run, and had found it defective, he should have known that it was defective, and should have used his guage-cocks instead.

The evidence further tended to show that the water glass was not defective, or that, if it was defective, Andrews should have known it, and was guilty of negligence in relying on the water glass, when he had other safe means at hand of ascertaining how much water was in his boiler.

Exception No. 20 is to the ruling of the court in refusing to permit the witnesses C. M. Butler and W. R. Moore to testifying to the fact that Andrews was discharged from the Atlantic Coast Line Railway for burning an engine. The personal record of Andrews with the Atlantic Coast Line was produced, which showed that he had been discharged for burning the crown-sheet of an engine. Andrews himself knew what his personal record showed, and that record showed that he had authorized the Atlantic Coast Line to furnish other railroad companies the information contained therein, and to state to other railroads the reason for his discharge.

This evidence being directly responsive to the evidence introduced by the plaintiff to show that he was a careful and competent engineer, was admissible for the purpose of contradicting that evidence, and was further admissible to show that his reputation as an engineer was not good, and that his earning capacity was, therefore, diminished.

VI. The sixth assignment of error is to the action of the court in refusing to set aside the verdict on the ground that the damages allowed were excessive.

Under the Employers.' Liability Act the damages are limited to compensation for the pecuniary loss sustained by the death of the decedent.

Michigan Central R. R. Co. vs. Vreeland, 227 U. S., 59; 57 Lawyers' Ed., 417.

The evidence of Mrs. Andrews is that her intestate earned from one hundred and twenty-five to two hundred dollars per month, and that he supported his family properly. The plaintiff would, therefore, only be entitled to such a sum as would have produced, exclusive of what it would have required for her intestate's maintenance and support, an income of approximately what he was contributing to his family during that period. From all the evidence it is certain that he was not contributing more than about twelve hundred dollars a year to the support of his family. The amount of the verdict at the legal rate of interest will produce twelve hundred dollars per year indefinitely, and at the expiration of Andrews' expectancy of life, the sum of twenty thousand dollars will still remain when, under the Employers' Liability Act, as construed by the above decisions, the plaintiff was only entitled to recover such sum as would be contributed to the support of herself and children during the lifetime of her intestate.

The verdict of the jury was excessive for the further reason that it allowed fully as much, if not more, than would compensate his wife and children for the pecuniary loss that they have sustained, without diminishing the recovery as required by the Act, in proportion to the contributory negligence of which Andrews was guilty. If the evidence can be considered sufficient to sustain a verdict on either of the alleged theories of the defendant's negligence, it conclusively shows that Andrews was guilty of contributory negligence, and the recovery should, therefore, have been diminished in the proportion that his negligence contributed to the injury.

VII. The seventh assignment of error is that the court below had no jurisdiction to try this case because the trial of the case by a jury of seven is in violation of the seventh amendment to the Federal Constitution.

The cause of action on which this action was based was created by the act of Congress, known as the Federal Employers' Liability Act. By an amendment to the sixth section of this act, the court of the several states are given concurrent jurisdiction with the courts

of the United States, and it is provided that no case brought in any state court of competent jurisdiction shall be removed to any court of the United States.

The seventh amendment to the Federal Constitution provides that in suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved. The trial by jury which the seventh amendment requires is a trial by such a jury as the common law of England provided for; that is, a jury of twelve men.

Capital Traction Co. v. Hof., 174 U. S. page 1; 43 L. Ed. p. 873.

The Virginia Constitution, section 11, provides that the legislature may limit the number of jurors in civil cases. Pursuant to this authority, the legislature, by section 3166 of the Code, has provided for a jury of seven in cases not cognizable by a Justice of the Peace.

The record shows that the case at bar was tried by a jury of seven. The cause of action having been created by Congress, and the jurisdiction to try this case having been conferred on the Circuit Court of Montgomery County by an act of Congress, Congress had no power, under the limitation imposed by the seventh amendment to the Federal Constitution, to confer jurisdiction to try a cause of action created by it on a court with a jury of less than twelve men.

It has been held that it is beyond the power of Congress to confer jurisdiction to try causes of action created by it unless the particular court is so constituted as to satisfy the seventh amendment to the Federal Constitution. The seventh amendment requires that all the substantial elements of a common law jury trial shall be preserved.

Springfield City v. Thomas, 166 U. S. 707, 41 L. Ed. 1172.

American Pub. Co. v. Fisher, 166 U. S. 464, 41 L. Ed. 1079.

The trial of this case, therefore, by a jury of seven men was not such a trial as is provided for by the seventh amendment of the Constitution, and no valid verdict on which the court could enter judgment could be rendered by a jury so constituted.

This objection to the jurisdiction of the court, or to the trial of

the case by a jury of seven, was not made in the court below. The fact that it was not made in the court below does not prevent the question being raised in the appellate court. The trial which was had, being in violation of the Federal Constitution, amounted to no trial at all. When the court attempted to try this case with a jury of seven by virtue of the constitution, it had no jurisdiction of the subject matter of the action.

The principle is familiar that where there is a want of jurisdiction of the subject matter, the consent of parties cannot give jurisdiction. A party cannot be held to have waived the right to object to the jurisdiction of a court that has no jurisdiction of the subject matter.

8 Encyc. Digest of Va. and W. Va., Rep. p. 904, and cases cited.

Where it appears from the proceedings that there is a want of jurisdiction of the subject matter, objection can be made to the jurisdiction for the first time in the appellate court.

1st Encyc. Digest Va. and W. Va. Rep. 548, and cases cited.

It is, therefore, submitted that the trial of this case in the court below by a jury of seven in violation of the seventh amendment to the Federal Constitution rendered the proceedings in said court a nullity, and the verdict and judgment thereon should, therefore, be set aside and annulled.

For the reasons assigned in the foregoing petition, your petitioner prays that a writ of error and supersedeas may be awarded to it, and that the judgment complained of herein may be reviewed and reversed.

Respectfully submitted,

THE VIRGINIAN RAILWAY COMPANY,
By Counsel.

ELLETT & PHLEGER,
G. A. WINGFIELD,
HALL, WOODS & COXE.
Attorneys for the Petitioner.

I, H. T. Hall, an attorney practicing in the Supreme Court of Appeals of Virginia, do certify that in my opinion the judgment

complained of in the foregoing petition is erroneous, and should be reviewed and reversed.

H. T. Hall.

Roanoke, Va., December 30th, 1914.

Received Dec. 31, 1914. R. H. C.

Writ of error and supersedeas awarded. Bond $22,000.00.

John A. Buchanan.

To Clerk of Court at Wytheville.

RECORD.

VIRGINIA:

Pleas before the Circuit Court for the County of Montgomery, Virginia, at first April Rules, 1914.

Maude L. Andrews, Administratrix of A. W. Andrews, dec'd.,

v.

The Virginian Railway Company.

Be it remembered that at rules held for the Circuit Court for the County of Montgomery, Virginia, on the first Monday in April, 1914, came the plaintiff and filed her original declaration, which is in the words and figures following, to-wit:

Virginia:

In the Circuit Court for the County of Montgomery.

Maude L. Andrews, Admrx. of A. W. Andrews, deceased,

v.

Virginian Railway Company.

DECLARATION.

Maude L. Andrews, Administratrix of A. W. Andrews, deceased, complains of the Virginian Railway Company, a corporation, with its principal office in the State of Virginia, of a plea of trespass on the case, for this, to-wit:

FIRST COUNT.

That heretofore, to-wit: on the 14th day of November, 1912, the defendant, the Virginian Railway Company, was the owner and operator of a certain line of railroad which extended from Norfolk, Virginia, to Princeton, West Virginia, and which ran and extended through the county of Montgomery, Virginia;

That at 10:20 p. m. on said day the said defendant was running

and operating a certain freight train consisting of engine No. 469, the tender thereof, three cars loaded with freight, and seventy-nine empty cars; that said empty cars and loaded cars, together with the freight contained in said loaded cars, were being transported from a point or points in Virginia to a point or points in West Virginia, and that said train was at said time engaged in interstate commerce.

That at said time the plaintiff's intestate, A. W. Andrews, was in the employment of the defendant railway company as a locomotive engineer, and was engaged in the performance of his duties as such engineer on engine No. 469, which was pulling said freight
[2] train as aforesaid, and that said plaintiff's intestate in his performance of his said duties at said time was engaged in interstate commerce.

Whereupon it became and was the duty of the said defendant company to have the boiler of said locomotive No. 469 and the appurtenances thereof in proper condition and safe to operate at said time in the service of pulling the said train as aforesaid.

Yet the said defendant company, not regarding its said duty, but negligently and wilfully failing in same, did have said locomotive No. 469 at said time equipped with an unsafe boiler, or with a boiler not in proper condition, said boiler being unsafe and not in proper condition to operate in the service to which the same was being put, in this, to-wit: that said boiler was defectively and improperly built and constructed, and improperly fastened and joined to the roof or top of said engine, and that the stay-bolts and crown bolts of said boiler were improperly screwed in and improperly adjusted in construction, and that the said crown-sheet of said boiler and the crown-bolts and stay-bolts thereof were constructed of defective and faulty material and by defective and faulty workmanship, and that the crown-sheet of said boiler at said time was weak and had been
[3] previously burned in service, and the stay-bolts and crown-bolts had been burned in service and were broken and were weak and unsafe and unable to withstand the ordinary pressure and strain imposed upon them by the steam which would ordinarily be generated in said boiler in the customary service of the said engine.

And the plaintiff avers that on the said 14th day of November, 1912, at about 10:20 p. m. on said day, at a point in Montgomery County, Virginia, about 300 feet west of defendant's mile post No. 264, while the said plaintiff's intestate was engaged in the performance of his said duties as engineer on said locomotive No. 469 in pulling said train of cars as aforesaid, the crown-sheet of the boiler of said engine No. 469 gave way as a result of said improper and

unsafe condition, and the water and steam from the boiler of said engine, and large volumes of ashes, steam and boiling water burst out of and through the stoker holes and into the cab of the engine, and scalded, injured and burned the plaintiff's intestate while he
[4] was in the cab of his engine in the performance of his duties as aforesaid, so that he died therefrom on the following day.

And the plaintiff avers that Maude L. Andrews, the widow of the said A. W. Andrews, and his four children, Arthur W. Andrews, aged seven; Martha J. Andrews, aged five years; Peyton C. Andrews, aged four years, and Macon Andrews, aged one year, survive the said plaintiff's intestate; and this suit is brought for the benefit of said widow and four children.

And the plaintiff avers that the said widow and four children have been greatly damaged by reason of the death of the said A. W. Andrews in this, to-wit, that they have been deprived of his contributions from his salary and earnings as a means of livelihood, support and comfort to them; that the said widow has been deprived of his personal services in and about her daily life, and that the said children have been deprived of his services for their care and education, and that they have suffered much and divers other damage in many and divers other ways therefrom.

[5] SECOND COUNT.

And for this, to-wit:

That heretofore, to-wit: on the 14th day of November, 1912, the defendant, the Virginian Railway Company, was the owner and operator of a certain line of railroad which extended from Norfolk, Virginia, to Princeton, West Virginia, and which ran and extended through the county of Montgomery, Virginia.

That at 10:20 p. m. on said day the said defendant was running and operating a certain freight train consisting of engine No. 469, the tender thereof, three cars loaded with freight, and seventy-nine empty cars; that said empty cars and loaded cars, together with the freight contained in said loaded cars, were being transported from a point or points in Virginia to a point or points in West Virginia, and that said train was at said time engaged in interstate commerce.

That at said time the plaintiff's intestate, A. W. Andrews, was in the employment of the defendant railway company as a locomotive engineer, and was engaged in the performance of his duties as such engineer on said engine No. 469, which was pulling said freight train as aforesaid, and that said plaintiff's intestate in his performance of his said duties at said time was engaged in interstate commerce.

Whereupon it became and was the duty of the said defendant company to have the boiler of said locomotive No. 469 and the appurtenances thereof in proper condition and safe to operate at said time in the service of pulling the said train as aforesaid.

Yet the said defendant company, not regarding its said duty, but negligently and wilfully failing in same, did have said locomotive No. 469 at said time equipped with an unsafe boiler and appurtenances thereof, and with a boiler and appurtenances thereof not in proper condition, said boiler and appurtenances thereof being unsafe and not in proper condition to operate in the service to which
[6] they were being put, in this, to-wit: that the injector on the engineer's side of said engine No. 469 was out of repair and failed to properly pump water from the tank of said engine into the boiler, and that the hose which conducted water into said injector had become stopped up and clogged so as not to allow water to flow freely from the tank into the said injector as it should have done; and that the valves of said injector were out of repair and not in proper working condition, and that the said injector was in a defective condition in other respects unknown to this complainant, and failed to properly pump water from the tank of said engine into the boiler.

And the plaintiff avers that on said day the said A. W. Andrews left Roanoke, Virginia, at 9:30 p. m. and operated, used and worked the injector on his said side of said engine continuously from the time he left Roanoke until the time of the explosion, as hereinafter set out.

And the plaintiff avers that a few moments prior to the explosion as hereinafter set out, the glass water guage of said engine No. 469 registered and indicated that the boiler of said engine was two-thirds full of water.

And plaintiff avers that about 10:20 p. m. of said day, at a point in Montgomery County, about 300 feet west of defendant's mile post No. 264, while the said plaintiff was engaged in the performance of his duties as engineer on locomotive No. 469, in pulling the said train of cars as aforesaid, the crown-sheet of the boiler of said loco-
[7] motive gave way, and the water and steam in the boiler of said engine rushed down in the fire box of said engine, and large volumes of ashes, steam and boiling water rushed out of and through the stoker holes and into the cab of said engine and scalded and injured and burned the plaintiff's intestate while he was in the cab of his engine in the performance of his duties as aforesaid, so that he died therefrom on the following day.

And the plaintiff avers that the giving way of said crown-sheet and the explosion and bursting of the boiler of said engine as afore-

said, was caused directly and proximately by the fact that the injector on the engineer's side of said locomotive was in an unsafe and improper condition, and did not properly pump the water from the
[8] tank into the boiler of said engine. And the plaintiff avers that if said injector had been working properly and had been in safe condition there would have been ample water in the boiler of said engine to have generated the proper amount of steam without any explosion or injury to the crown-sheet of said boiler.

And the plaintiff avers that Maude L. Andrews, the widow of the said A. W. Andrews, and his four children, Arthur W. Andrews, aged seven years; Martha J. Andrews, aged five years; Peyton C. Andrews, aged four years, and Macon Andrews, aged one year, survive the said plaintiff's intestate, and this suit is brought for the benefit of said widow and four children.

And the plaintiff avers that the said widow and four children have been greatly damaged by reason of the death of the said A. W. Andrews, in this, to-wit: that they have been deprived of his contributions from his salary and earnings as a means of livelihood, support and comfort to them; that the said widow has been deprived of his personal services in and about her daily life, and that the said children have been deprived of his services for their care and education, and that they have suffered much and divers other damage in many and divers other ways therefrom.

[9] THIRD COUNT.

And for this also, to-wit:

That heretofore, to-wit: on the 14th day of November, 1912, the defendant, the Virginian Railway Company, was the owner and operator of a certain line of railroad which extended from Norfolk, Virginia, to Princeton, West Virginia, and which ran and extended through the county of Montgomery, Virginia.

That at 10:20 p. m. on said day the said defendant was running and operating a certain freight train consisting of engine No. 469, the tender thereof, three cars loaded with freight, and seventy-nine empty cars; that said empty cars and loaded cars, together with the freight contained in said loaded cars, were being transported from a point or points in Virginia to a point or points in West Virginia, and that said train was at said time engaged in interstate commerce.

That at said time the plaintiff's intestate, A. W. Andrews, was in the employment of the defendant railway company as a locomotive engineer, and was engaged in the performance of his duties as such

engineer on said engine No. 469, which was pulling said freight train as aforesaid, and that said plaintiff's intestate in his performance of his said duties at said time was engaged in interstate commerce.

Whereupon it became and was the duty of the said defendant company to have the boiler of said locomotive No. 469 and the appurtenances thereof in proper condition and safe to operate at said time in the service of pulling the said train as aforesaid.

Yet the said defendant company, not regarding its said duty but negligently and wilfully failing in same, did have said locomotive No. 469 at said time equipped with an unsafe boiler and appurtenances thereof not in proper condition, said boiler and appurtenances thereof being unsafe and not in proper condition to operate in
[10] the service to which they were being put, in this, to-wit: that the glass water guage intended and ordinarily used for the purpose of registering and indicating to the engineer and fireman the quantity of water contained in the boiler of said engine at any and all times, was out of repair and in an unsafe condition, and the valves or holes at the bottom or top through which the water was supposed to circulate and flow were stopped up by lime and trash and deposits and by other substances, and that said glass water guage was otherwise out of repair and in an unsafe condition in divers other ways unknown to this complainant, and that said glass water guage improperly and erroneously registered the quantity of water contained in said boiler.

And the plaintiff avers that on said day the said A. W. Andrews left Roanoke, Virginia, at 9:30 p. m. and operated, used and worked the injector on his said side of said engine continually from the time he left Roanoke until the time of the explosion, as hereinafter set out.

And the plaintiff avers that a few moments prior to the explosion as hereinafter set out, the glass water guage of said engine No. 469 registered and indicated that the boiler of said engine was two-thirds full of water.

And plaintiff avers that about 10:20 p. m. of said day, at a point in Montgomery County, about 300 feet west of defendant's mile post No. 264, while the said plaintiff was engaged in the performance of his duties as engineer on locomotive No. 469, in pulling the said train of cars as aforesaid, the crown-sheet of the boiler of said loco-
[11] motive gave way, and the water and steam in the boiler of said engine rushed down in the fire box of said engine, and large volumes of ashes, steam and boiling water rushed out of and through the stoker holes and into the cab of said engine, and scalded and injured and burned the plaintiff's intestate while he was in the cab of his engine, in the performance of his duties as aforesaid, so that he

died therefrom on the following day.

And the plaintiff avers that the giving way of said crown-sheet and the explosion and bursting of the boiler of said engine, as aforesaid, was caused directly and proximately by the fact that the glass water guage of said engine was in an unsafe and improper condition as above alleged, and incorrectly and erroneously registered and indicated that said boiler was two-thirds full of water, while the truth was that the water in said boiler was very low, and the absence of a proper quantity of water caused the crown-sheet of said boiler to give way from the pressure of the steam as aforesaid. And the plaintiff avers

[12] that if said water guage of said engine had properly registered the quantity of water in said boiler said plaintiff's intestate and his fireman could have used other means for the purpose of pumping or forcing water from the tank into the said boiler, and could thus have avoided the explosion, and injury and death of the said plaintiff's intestate.

And the plaintiff avers that Maude L. Andrews, the widow of the said A. W. Andrews, and his four children, Arthur W. Andrews, aged seven years; Martha J. Andrews, aged five years; Peyton C. Andrews, aged four years, and Macon Andrews, aged one year, survive the said plaintiff's intestate, and this suit is brought for the benefit of said widow and four children.

And the plaintiff avers that the said widow and four children have been greatly damaged by reason of the death of the said A. W. Andrews, in this, to-wit: that they have been deprived of his contributions from his salary and earnings as a means of livelihood, support and comfort to them; that the said widow has been deprived of his personal services in and about her daily life, and that the said children have been deprived of his services for their care and education, and that they have suffered much and divers other damage in many and divers other ways therefrom.

[13] FOURTH COUNT.

And for this, to-wit:

That heretofore, to-wit: on the 14th day of November, 1912, the defendant, the Virginian Railway Company, was the owner and operator of a certain line of railroad which extended from Norfolk, Virginia, to Princeton, West Virginia, and which ran and extended through the county of Montgomery, Virginia.

That at 10:20 p. m. on said day, the said defendant was running and operating a certain freight train consisting of engine No. 469, the tender thereof, three cars loaded with freight, and seventy-nine empty cars; that said empty cars and loaded cars, together with the freight contained in said loaded cars, were being transported from a point or points in Virginia to a point or points in West Virginia, and that said train was at said time engaged in interstate commerce.

That at said time the plaintiff's intestate, A. W. Andrews, was in the employment of the defendant railway company as a locomotive engineer, and was engaged in the performance of his duties as such engineer, on said engine No. 469, which was pulling said freight train as aforesaid, and that said plaintiff's intestate in his performance of his said duties at said time was engaged in interstate commerce.

And the plaintiff avers that the fire box of the said engine No. 469 was located immediately beneath the boiler of said engine, and that in the event of a failure in the crown-sheet of the boiler of said engine the water and steam therefrom would necessarily rush down into the fire box with great force and violence, and force and
[14] blow out the coals and cinders from said fire box into and through any opening or weak point in the walls around said fire box which should happen to give way.

And the plaintiff avers that it is a recognized fact among all railroad employees and workmen and among all people engaged in the business of running engines, that failure of the crown-sheet of the boiler of a locomotive is an occurrence which may happen at any time, and is one of the most imminent dangers to be guarded against in the operation and running of a locomotive, and that railroad companies have employed such devices known as "soft plugs" located in the crown-sheets of said boilers as a protection against the giving away of said crown-sheets, and that railroad companies now use an automatic appliance known as a low water alarm, which automatically reveals to the engineer the fact that the water in the boiler of the locomotive is low.

And plaintiff avers that there was only one partition between the said fire box and the cab of said engine where the said A. W. Andrews was at all times engaged in the performance of his duties as engineer on said engine or locomotive, and that in the event of the failure of the crown-sheet of said locomotive, the only partition which
[15] would separate the said A. W. Andrews from the violence and force of the explosion due to the giving away of said crown-

sheet, would be said partition between said fire box and the cab of said engine.

And the plaintiff avers that at all times while he was engaged in the performance of his duties as engineer on said locomotive, that there was danger that the crown-sheet of said locomotive would fail, and that the said partition which separated the cab of the said engine from the fire box would be subjected to a violent strain and pressure resulting from said explosion.

And the plaintiff avers that a reasonable strong and firm partition was necessary between the said fire box and the cab of said engine in order to protect plaintiff's intestate from known and recognized dangers which arise from the failure of the crown-sheets of boilers and the consequent explosion thereof.

Whereupon it became and was the duty of the said defendant company to use reasonable care to provide a safe place wherein the plaintiff's intestate could perform his duties as engineer on said locomotive as aforesaid.

Yet the said defendant company, not regarding its said duty, but negligently and wilfully failing in same, did have a number, to-wit: —— stoker holes cut into the partition between said fire box and the said engineer's cab of said engine, and that the said stoker holes had been cut into the said partition of said engine for the purpose of fastening on to said partition a stoker for use in firing said engine: but said defendant had never used a stoker on said engine, and did negligently and wilfully fail to properly cover or build over the said openings or exposures made by said stoker holes, but did have a covering over the said stoker holes consisting of a very thin, weak and inefficient metal, to-wit: sheet iron, which was incapable of withstanding anything like the pressure to which the same would be subjected in the event that the crown sheet in the boiler of said engine should fail or give way as aforesaid.

And the plaintiff avers that on the said 14th day of November, 1912, about 10:20 p. m., at a point in Montgomery County, Virginia, about 300 feet west of defendant's mile post No. 264, while the said plaintiff was engaged in the performance of his duties as engineer on locomotive No. 469, in pulling the said train and cars as aforesaid, the crown-sheet of the boiler of said engine No. 469 gave way, and the water and steam from the boiler of said engine rushed
[17] down into the fire box of said engine, and large volumes of ashes, steam and boiling water burst out of and through the

stoker holes and into the cab of said engine, and scalded, injured and burned the plaintiff's intestate while he was in the cab of his engine in the performance of his duties as aforesaid, so that he died therefrom on the following day.

And the plaintiff avers that the injury to and death of the said plaintiff's intestate was the direct and proximate cause of the failure of the said defendant in not using reasonable care to properly and efficiently cover over said stoker holes, and that if said stoker holes had been covered over with reasonable safety the said plaintiff's intestate would not have received any material or serious injury as a result of said explosion.

And the plaintiff avers that Maude L. Andrews, the widow of the said A. W. Andrews, and his four children, Arthur W. Andrews, aged seven years; Martha J. Andrews, aged five years; Peyton C. Andrews, aged four years, and Macon Andrews, aged one year, survive the said plaintiff's intestate, and this suit is brought for the benefit of said widow and four children.

And the plaintiff avers that the said widow and four children have been greatly damaged by reason of the death of the said A. W. Andrews, in this, to-wit: that they have been deprived of his contributions from his salary and earnings as a means of livelihood, support and comfort to them; that the said widow has been deprived of his personal services in and about her daily life, and that the said children have been deprived of his services for their care and education, and that they have suffered much and divers other damage in many and divers other ways therefrom.

Wherefore, the plaintiff says that she has been damaged in the sum of $50,000.00, and hence she brings her suit.

MAUDE L. ANDREWS,
Administratrix of A. W. Andrews, dec'd.
By Counsel.

ABRAM P. STAPLES, JR.,
A. B. HUNT, *p. q.*

Maude L. Andrews, Administratrix of A. W. Andrews, deceased,

v.

The Virginian Railway Company.

[2] BILL OF EXCEPTIONS No. 1.

Be it remembered that upon the trial of this case, the plaintiff

and the defendant, to maintain the issues on their parts respectively, introduced the following evidence:

MONDAY, OCTOBER 5th, 1914.

The above entitled cause was called for trial at four o'clock p. m. Monday, October the 5th, 1914, the jury were sworn to try the case, and the opening statements were made by counsel for plaintiff and defendant, and court adjourned until tomorrow morning, Tuesday, October the 6th, 1914.

TUESDAY, OCTOBER 6th, 1914—MORNING SESSION.

[3] EVIDENCE INTRODUCED IN BEHALF OF THE PLAINTIFF.

JERRE WALTON.

Jerre Walton, sworn, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Hunt:

Q. Mr. Walton, what is your age?
A. Thirty-two.
Q. Where do you live?
A. Fayette County, West Virginia.
Q. Where were you at work on November the 12th, 1912?
A. Where was I working?
Q. Yes?
A. For the Virginian Railway.
Q. In what capacity?
A. Fireman.
Q. Did you know Mr. Andrews?
A. Yes, sir.
Q. Were you with him the day that he was killed?
A. Yes, sir.
Q. Where was he killed?

[4] A. He was killed eighteen miles out of Roanoke, I understood, on the Virginian Railroad.

Q. On the Virginian Railroad?
A. Yes, sir.

Q. In Montgomery County, was it?

A. Yes, sir.

Q. What was he doing, was he running an engine?

A. Yes, sir; he was the engineer.

Q. And you were the fireman for that engine?

A. Yes, sir.

Q. Who was on the engine at the time he was killed?

A. Nobody but myself and a brakeman named Lucas and Mr. Andrews.

Q. The brakeman and Mr. Andrews and yourself?

A. Yes, sir.

Q. Where is Mr. Lucas?

A. He was killed.

Q. He was killed also?

A. Yes, sir.

Q. When was that?

A. November the 14th, 1912.

Q. What time did you leave Roanoke on that day or night?

A. We were called to leave 8:45.

[5] Q. In the evening or morning?

A. In the evening.

Q. At what time did this accident occur?

A. Between 10:10 and 10:20.

Q. Will you state whether or not it is your duty as fireman to ascertain whether there is a proper amount of water in the boiler of the engine and in the tender when you start on a trip?

A. Yes, sir; it is my business to see about the water in the tender when we are starting, but for keeping water in the boiler I had nothing to do with it.

Q. Keeping water in the boiler, you had nothing to do with that?

A. No, sir.

Q. Was it within your line of duty to see that the water was in the boiler when you began a trip or when you started?

A. No, sir; it was not my duty.

Q. Whose duty was that, the engineer's?

A. Yes, sir; the engineer's.

Q. You may state, if you happen to know, whether or not you had water in the boiler and in the tank also when this trip was begun?

A. Yes, sir.

Q. As you left Roanoke about how much water was in the boiler?

A. It was a little better than half full, the glass was, when [6] we left.

Q. The glass was more than half full; what glass do you mean?

A. That indicates the water.

Q. Where is that glass arranged?

A. It is right on the head of the boiler.

Q. Is it where you, as fireman, can see it plainly?

A. Yes, sir.

Q. On which side of the engine is that glass located, on the side next to the engineer or where the fireman stays?

A. On the side next to the engineer.

Q. Now, what did Mr. Andrews, the engineer, do when he started on that trip after you got started; what did he do, if anything, with reference to the injector—was the injector on or off?

A. He put the injector on right after we got out of the switch on to the main line.

Q. Near the Roanoke yard?

A. Yes, sir; leaving the yard.

Q. Which injector was that, the right or left injector?

A. It was the right injector.

Q. Will you tell the jury whether or not that injector stayed on from that time until the accident?

A. It did.

Q. Mr. Walton, you had been firing how long?

A. As well as I remember, eighteen months.

Q. Will one injector supply the engine, working under the [7] condition that that engine was working that day?

A. Yes, sir; it had been doing it.

Q. Tell the jury whether or not a fireman can tell whether the injector is working.

A. Yes, sir.

Q. Was there any trouble with the injector at all?

A. None at all.

Q. Will you state whether or not it was throwing water into the boiler?

A. As indicated by the glass, the water was going into the boiler.

Q. The glass showed that it was?

A. Yes, sir.

Q. Can you tell apart from the glass whether or not it was, when you opened the door to fire?

A. How is that?

Q. Apart from the glass, not considering the glass indicator, now, can you tell independently of that whether or not the water was being thrown into the boiler by means of the injector, when you opened the door to fire?

A. You mean could you know whether the injector was working or not working?

Q. Yes?

A. Yes, sir; you could tell.

Q. How could you tell that?

A. By the sound of the water going through the pipe.

Q. Is that a difficult matter to determine or an easy matter?

[8] A. That is an easy matter, any one could tell if the injector was working.

Q. And you tell the jury when you opened the door to fire the engine you know the injector was throwing water into the boiler?

A. Yes, sir; it indicated it on the glass and you could hear the sound of it.

Q. When was the last time before the accident that you noticed that the injector was working?

A. Just as we were coming along by Singer water tank.

Q. What did you have to do there at that point?

A. I looked at the glass—I asked him before we came up there if he was going to take water, and he said no, he was making a nice run or something like that.

By Mr. Hall:

Don't say what he said, just say whether you took water or not.

Witness:

No, sir; we did not take water; he said he was making a nice run and—

By Mr. Hall:

(Interposing) Don't say what he said.

Q. Don't say what Mr. Andrews said to you.

By the Court:

Just tell what you did.

A. I put in fire there after I looked at the glass.

Q. You said you did not put in any water because you did not think it was necessary?

A. No, sir.

Q. Now leave out what Mr. Andrews said.

[9] A. Very well. I put fire in there and just before putting the fire in it, I looked at the glass and the glass indicated that much from the top (indicating with finger). That is the last time I looked on the indicator from the time the engine blew up or blowed down.

Q. That was at Singer tank?

A. Yes, sir.

Q. When did you attend to your fire again after passing Singer tank?

A. It was soon after that, but I couldn't exactly say. I throwed in about three shovels of coal and stepped up out of the gangway up on the window and leaned out of the window, and just as I stepped up there and leaned out, this accident happened.

Q. Then, do you mean to tell the jury that you fired the engine or threw three shovels of coal into it just immediately before the accident happened?

A. Yes, sir.

Q. At that time, did you notice the injector working?

A. Yes, sir; the injector was working.

Q. Was that as much as a minute before the accident?

A. From the time I put the last fire in?

Q. Yes?

A. I just stepped down and took the shovel and throwed in about three shovelfuls and stepped up there and it happened.

Q. In estimating that by time, would you say it was as

[10] much as a minute before the accident, or how long would you say?

A. Well, just like you would step right out there and lean out.

Q. I want to get it in the record and I would like for you to fix it by the time, if you can.

A. It wouldn't take but a mighty short time.

By the Court:

Just approximate it; was it a minute or what?

Q. Was it ten or fifteen seconds or half a minute?

A. It wouldn't take much more than a second or two to step

from the door and lean out of the window, just like you would step from here on to this and lean over (indicating).

Q. The time it took you to do that, and at the expiration of that time I understood you to say the explosion occurred?

A. Yes, sir; as I leaned over.

Q. You say the water glass showed about that far, if I caught your correct measurement by your finger, from the top; what did you mean, about a half an inch from the top or what?

A. Yes, sir; something like a half an inch from the top of the glass of being full.

Q. How much water—or do you know how much water that would put over the crown-sheet?

A. I couldn't exactly tell, because I wasn't acquainted with that class of engine.

Q. Can you approximate it for us; I don't mean for you to be accurate, but can you approximate it in inches?

By Mr. Hall:

We object to the question because the witness has stated that he is not familiar with that class of engine.

By the Court:

You say you are not familiar with that class of engine, are you familiar enough with engines to approximate it?

Witness:

No, sir; I cannot say.

By Mr. Hunt:

Very well.

Q. Was the injector at Singer water tank working all right?

A. Yes, sir.

Q. Are you familiar with the different sounds made by an injector when it is not working and when it is working?

A. Yes, sir.

Q. I want you to explain that to the jury, please.

A. How is that?

Q. I want you to tell the jury what kind of a sound an injector makes when it is not throwing water into the tank and what kind of sound it makes when it is throwing water into the boiler.

A. If it ain't putting water into the boiler, it will make a noise, a steam noise, and when it is putting water in it makes a solid sound, a gurgling sound.

Q. And you tell the jury at Singer station and at the time you

last fired a few seconds before the accident it was making this solid sound?

A. Yes, sir.

Q. Were you making a nice smooth run on that day?

[12] A. Yes, sir; we were.

Q. Was there anything about the engine to suggest trouble at all, as far as you could see?

A. None at all that I know of.

Q. Did you have any delay on that trip at all?

A. None at all.

Q. Do you know when your engine or boiler, what pressure it was locked down to?

A. 180.

Q. Was it 180 or 185?

A. As well as I remember it was 180.

Q. Now, what do you mean; I want you to explain that to the court and jury, please, about the engine being locked down a certain number of pounds; what does that mean?

A. If we get over 180, if it is locked down to 180, there is a release valve that will pop off.

Q. Then the steam will go off when it reaches a higher pressure than that to which it is locked to?

A. Yes, sir.

Q. Tell the court and jury whether or not at this point, and at the point of the accident and at Singer tank and all along, you had a full head of steam?

A. Yes, sir.

Q. Was the engine popping off at the point of accident?

[13] A. Yes, sir; it was.

Q. What was the first thing you knew when this accident occurred?

A. The first thing I knew when it occurred?

Q. Yes?

A. I don't understand you.

Q. As soon as the accident occurred, what did it do to you?

A. Just as soon as it occurred, it blew me out of the window, and the next thing I knew I lit on my face and breast.

Q. Have you any interest in this suit in any way on earth?

A. None at all.

Q. You have adjusted all of your differences with the Company, haven't you?

A. Yes, sir; I have.

Q. When it threw you out, was any water around there?

A. No, there wasn't none there; but it seemed like there was a good bit just before I left—it blew me out of there and my clothes were all wet.

Q. That is what I am trying to get at, whether your clothes were wet all over?

A. Yes, sir.

Q. Was the water hot or cold?

A. It was pretty hot, the side it hit me on.

[14] Q. Did it scald you?

A. Yes, sir.

Q. You were laid up for sometime, I believe, by reason of that?

A. Yes, sir.

Q. Now, how far below where you were thrown out was Mr Andrews thrown out?

A. It wasn't but just a few steps below me where he was at.

Q. Was he thrown out on the same side of the train that you were, or on the opposite side?

A. Yes, sir.

Q. The same side?

A. Yes, sir; the same side I was blown out of.

Q. In car lengths, about how far below were you?

A. I do not think it was hardly a car length; it did not seem to me like it was from where I could hear him.

Q. You mean further on?

A. Yes, sir.

Q. In the direction in which the train was going?

A. Yes, sir.

Q. You say you could hear him and see him?

A. No, I couldn't see him, but I could hear him.

Q. Do you know how long he lived?

A. This happened at 10:20 and he lived until 11:55 the next day, I think.

Q. Where was the brakeman thrown out?

[15] A. He was thrown out over on the opposite side of the train.

Q. On which side of the track was the brakeman when the explosion occurred?

A. He was sitting on the left side, on my seat-box.

Q. With you?

A. He was sitting there by himself and I was standing right behind him; just stepped up behind him.

Q. And he was thrown out on the opposite side, you say?

A. Yes, sir.

Q. How far below where you were thrown out was he thrown out?

A. It seemed to me where I could hear him struggling it was just about like this, right across that way (indicating).

Q. What kind of a door was on that engine?

A. There was an air door.

Q. Do you know whether the door was blown open or not?

[16] A. No, sir; I cannot say; I never seen it.

Q. How much does that tank hold, do you know?

A. No, sir; I don't know its capacity.

Q. Do you know how many times the tank will fill the boiler?

A. I couldn't answer that question because I don't know for certain.

Q. Do you know whether the left injector was working at all that day?

A. No, sir; it was not.

Q. Was it put on at all?

A. No, sir.

Q. The left injector was on the side upon which you were located?

A. Yes, sir.

Q. If the left injector had been put on, would you have been bound to have seen it?

A. Yes, sir.

Q. And you tell the jury that at no time up to the accident was the left injector put on?

A. No, sir; it was not.

Q. Now, Mr. Walton, will you tell the jury whether or not in firing you can see inside the fire box?

A. Yes, sir; you can.

[17] Q. Can you see the crown-sheet?

A. Yes, sir; you can see it by taking a little notice of it, but not all the time, we do not see it.

Q. In every spade of coal that you throw in do you see the crown sheet?

A. No, sir.

Q. Tell the jury whether or not that crown-sheet was heated

to a red hot heat at the time of this accident?

A. No, sir; I cannot say.

Q. Mr. Walton, if a crown sheet is heated to a red heat will it make any different light in the fire box than when not heated—the difference between a blue and red appearance, I mean?

Defendant objected.

By the Court:

You may ask him about the general effect, not at this particular time, but the general effect of over-heating.

Defendant excepted.

A. I never did see one heated.

By the Court:

You are talking about the under side of that crown sheet?

By Mr. Staples:

Which is the top of the fire box.

Q. How is that fire box made with reference to the crown-sheet describe that to the jury?

A. I don't know as I could do that.

[18] Q. The best you can; I do not ask you to draw an accurate drawing of it.

A. How the fire box is made?

By Mr. Hunt, continuing:

Q. I will ask you this question: Was the crown sheet of that boiler so much within the range of your vision in firing the boiler that if it had been heated to a red heat that you would have been bound to have noticed it?

Q. Do you understand the question?

A. I couldn't say positively on that.

Q. Give us your best judgment on that?

Q. What do you say to that?

A. I suppose you would.

By Mr. Hall:

He answered that question once.

By the Court:

He said: "I could not say," and then a direct question was repeated to him, and he now says he suppose he could.

By Mr. Hall:

Well, we object to it.

Objection overruled. Defendant excepted.

A. You never gave me time to answer that question.

By Mr. Hall:

Wait a minute until the court makes a ruling.

By the Court:

Go ahead. Do you want to say anything further, Mr. Walton? You started to say something; go ahead and say it if you want to answer it.

A. I started to make an answer a little while ago and then you all objected to it and I never answered the question.

By the Court:

When either side objects you just stop talking.

Witness:

Yes, sir; I do.

By Mr. Hunt:

And after the court rules on it, then you can go on and finish your answer if the court says so.

Q. Now, then, to clarify the record upon this point, do I understand you to say that if the crown-sheet had been heated to a red heat it was so within your range of vision while firing the engine, that you think you would have been bound to have seen it?

A. Yes, sir.

Q. Now, will you tell the jury whether or not you saw any red crown-sheet?

A. No, sir; I did not.

[20] Q. Were you in a position to say about the amount of water that was thrown out of there, or do you know anything about that.

By the Court:

He asked him if he was in a position to tell, and he has not said whether he was or not. Were you in a position to approximate how much water was thrown out?

Witness:

No, sir.

Q. It didn't take you long to get away?

A. No, sir.

Q. In minutes, will you tell us how long it was, as near as you can, from the time that you looked at the water glass near Singer station until this accident?

A. It wasn't over three or four minutes.

Q. It was not over three or four minutes?

A. No, sir.

Q. Had you passed Singer water tank, or do you think you had passed it, when you looked at the water glass?

By Mr. Hunt:

Read the question.

(Question read to witness.)

A. Just about passing the tank, when I looked at, just about passing the tank, the last time I seen it.

Q. And that you think was three or four minutes before the accident?

A. Yes, sir.

Q. Had you fired for other engineers on the same class and kind of engine that this was?

A. Yes, sir.

Q. Will you tell the court and jury how many injectors they worked on their runs?

A. Just one is all ever I knowed on that class of engine.

[22] Q. Will you tell the court and jury what kind of man Mr. Andrews was? I will get you to describe him to the jury so that the jury can get your estimate of the man.

A. He was a nice gentlemanly man in all respects, my best knowing of him.

Q. About what aged man was he?

A. I couldn't say about what age he was.

Q. Will you tell the jury whether or not he was recognized in railroad circles as a careful and painstaking man?

A. Yes, sir; he was.

By Mr. Hunt:

In regard to the question that was objected to a little while ago, while it has gone in, I will ask the court to withdraw that question and answer and ask the court to say to the jury that they need not consider it.

By Mr. Hall:

We object to that; he has asked the question and it has been answered, and the jury has got the benefit of it, and we object to it being withdrawn and stricken out.

By the Court:

I will let it stay in.

Q. I understood you to say that this injector had been working from the time you left the yard at Roanoke up to the time of the point of the accident?

A. Yes, sir.

Q. Can you tell us whether or not the glass showed varying quantities of water?

A. Yes, sir; it did.

[23] Q. Will you state to the court and jury whether or not you gained water from the time you left Roanoke until you reached Singer tank, or lost water, as shown by the guage glass?

A. We gained water.

Q. Will you tell the court and jury as to the grade along there, which is the heaviest grade, from Roanoke to Singer tank or from Singer tank to the point of the accident?

A. It is a pretty heavy grade out of the yard to the Norfolk & Western overhead bridge, and there is a viaduct around there, and from there on to Singer it is about a gradual light grade, all right to pull, though.

Q. I mean the heaviest maximum grade, is the heaviest grade between Roanoke and Singer or between Singer and the point of the accident?

A. Between here and Singer is the heaviest pull.

Q. The heaviest pull is between the point of the accident and Singer then?

A. Yes, sir.

Q. When you first went to the engine that evening, was any one in charge of the engine?

A. Nobody but Mr. Andrews.

Q. Was there any hostler there?

A. None at all.

Q. There was no one except Mr. Andrews?

[24] A. That is all.

CROSS-EXAMINATION.

By Mr. Hall:

Q. This was your first trip on this engine, wasn't it?

A. Yes, sir.

Q. Was it your first trip with Mr. Andrews as engineer?

A. Yes; on a through run it was.

Q. You say you left Roanoke about 8:45 p. m. that evening?

A. Yes, sir.

Q. And when you got to the roundhouse Mr. Andrews was

[25] there in charge of his engine?

A. He was in the roundhouse when I got there, but he went out to the engine before I went out there.

Q. When you went on the engine Mr. Andrews was on the engine and in charge of it?

A. Yes, sir.

Q. And you did not see any hostler there?

A. No, sir.

Q. Isn't it a fact that the hostler turns the engine over to the engineer and leaves when the engineer comes and takes charge?

A. I suppose he does.

Q. Don't you know he does?

A. Yes; I know the engineer takes charge.

Q. It wasn't anything unusual then for you to find Mr. Andrews there in charge of his engine without a hostler on the engine with him, was it?

A. No, sir.

Q. You say it is the duty of the fireman to look after the

[26] water in the tank and see how much water is in the tank?

A. When you are taking the engine out of the roundhouse it is.

Q. And then it is the duty of the engineer to look out for the water in the boiler?

A. Yes, sir.

Q. The fireman has nothing to do with that?

A. No, sir.

Q. This water glass, I believe you say, is located over next to the engineer's side of the engine, isn't it?

A. It is on the right side of the engine; yes, sir.

Q. And it faces, so to speak, right where the engineer is

[27] sitting?

A. Most anybody can see it on the engine. It sets there so anybody on the engine mostly can see it, especially the fireman.

Q. Isn't there a flat side to this water glass into which you look to see whether there is water shown in the glass or not?

A. Of course the flat is facing you.

Q. And that is where you look to see whether there is water in the glass or not?

A. Yes, sir.

Q. That flat part?

A. To look at the water glass.

Q. That flat part of the glass faces the engineer, doesn't it?

A. Not particular, sometimes you find them that way and sometimes you do not.

Q. Sometimes you do not?

A. No, sir.

Q. If it did not face the engineer then he cannot sit on his seat-box and see it?

A. It is a mighty easy matter for him to turn around and see it; I have seen him do it.

Q. Isn't it a fact that the engineer always adjusts his water glass so that the flat part will be facing him, so that he can sit there and see it?

A. I guess I have seen him do that.

[28] Q. Don't they usually do that?

A. No, sir.

Q. How do they usually do?

A. If it is so that it is inconvenient for him, they generally take a wrench and turn it around; if it won't go around on the thread, why they leave it sit.

Q. I wish you would tell the jury whether this flat part of this glass was facing straight back to the rear of the engine or was it facing Mr. Andrews?

A. It wasn't facing him; it was just about like that (indicating), up on the boiler head, just like my two fingers there, it was only turned around like that (indicating), it wasn't turned around my side at all, it was on the boiler head, something like that (indicating).

Q. Wasn't the flat side facing him more than it was you?

A. Not as I noticed, it wasn't.

Q. Not as you noticed?

A. No, sir.

Q. You say that you watched this water glass pretty closely on that trip?

A. Going up the hills, all firemen do, mostly all do, that is his

business to look after the water and steam and fire; that is mostly their business, to pay attention to the glass.

Q. And you paid attention to it all the way on this trip up to Singer tank?

A. Pretty much all the way after we got over that overhead bridge.

Q. And you got over that?

[29] A. Yes, sir.

Q. You looked at it as you crossed the overhead bridge over the Norfolk & Western?

A. Yes, sir; I noticed it just before we came up to that.

Q. And then you did not look at it any more until you got to Singer tank?

A. No, sir; just going by there.

Q. And then you did not look at it any more until after the explosion occurred?

A. No, sir; I did not.

Q. I mean you did not look at it between that time and when the explosion occurred?

A. No, sir.

Q. You say it was three or four minutes after you left Singer tank until the explosion occurred?

A. I would say it was about that time.

Q. About three or four minutes?

A. Yes, sir.

Q. Do you know how far it was?

A. No, sir; I don't know; I couldn't say.

Q. You couldn't say?

A. No, sir; I positively could not.

Q. It was between three or four miles, wasn't it?

A. I don't know, I cannot say where the accident happened at, it was in the night.

Q. You don't know where the accident happened at?

[30] A. No, sir; I cannot say; no.

Q. And you say it was only three or four minutes from the time you left Singer tank until it did happen?

A. I gave that as an estimate, the best I could; that is the way the question was asked me.

Q. How fast was the train running?

A. I suppose it was running eighteen or twenty miles an hour.

Q. That is a pretty fast speed for that section of the road with a heavy freight train, isn't it?

A. It is nothing extra.

Q. Going up there?

A. Not along that part there.

Q. You were standing up at your seat-box on your knees with your head out of the window?

A. I just had leaned out there and had one knee on the seat-box when it happened.

Q. And you went out of that window?

A. It threw me out.

Q. On your side of the engine?

A. Yes, sir.

Q. And the brakeman who was on that side of the engine with you the last time you saw him, he went out on the other side and fell on the right side of the track, didn't he?

A. Yes, sir; that is where I heard him at.

[31] Q. You heard him over there?

A. Yes, sir.

Q. And Mr. Andrews, who was across on the right side, he came across on your side and went out?

A. I don't know how he got out of there.

Q. You know he was on your side?

A. That is where he was.

Q. He had to come across in front of that fire box in order to get over there, didn't he?

A. I couldn't say.

Q. Tell the jury how he would have gotten over there without crossing the platform there in front of the fire box?

A. I couldn't say in a case like that; I wasn't on there long enough to tell; I don't know how he came out of there or anything like that.

Q. You do know he was on your side?

A. I do know that they found him on that side.

Q. And there isn't any way you could tell the jury that he could have gotten over on that side without crossing in front of the engine box?

A. I cannot say anything about that, because I don't know what happened after it took effect.

Q. You don't know what happened?

A. No, sir; I cannot say how they got out of there or anything

about it.

Q. You did not turn on this left injector, did you?

A. No, sir.

[32] Q. And you did not see Mr. Andrews turn it on?

A. No, sir.

Q. You don't know anything about the window on the right side of the engine cab, do you, whether it was open or shut?

A. It was closed to my best remembrance.

Q. You say that the water glass at the time you looked at it at Singer tank showed water in it about one-half an inch from the top, was that your statement?

A. Yes, sir; I said just about that much (indicating).

Q. Didn't you afterwards say this, when Mr. Hunt asked you how much that was, that it was about half an inch?

A. No, sir; I did not.

Q. You did not?

A. No, sir; I said something about like that (indicating).

Q. Well, what do you say now, was it a half an inch or an inch from the top?

A. I don't know; just about like that, you can use it as you want it.

By the Court:

Say about how much that is.

Witness:

That would be about half an inch from being at the top of the glass. I will say that.

Q. You did not say that before?

A. No, sir; I said it looked about that much.

Q. So I was mistaken in thinking that you said before that it was about half an inch from the top of the glass?

A. I suppose you were.

[33] Q. When you testified in this case before, how far did you say it was from the top of the glass?

A. I said about the same thing. That has been so long I do not exactly remember; I could not tell you.

Q. You said about the same thing, did you?

A. I suppose I did, I can't exactly tell.

Q. How long ago has it been?

A. Two years the 14th of this coming month.

Q. I mean when you made the previous statement in this case

as to how much water was in the glass?

A. It was last February.

Q. I will ask you if you did not make this statement at the last trial, when you testified in this case, speaking of the water glass: "I looked at it pretty often going out of here until we got to the Norfolk & Western bridge, where we crossed the Norfolk & Western up here, and it showed better than half full of water, and then I never paid any more attention to it until we got to Singer water tank, and when we got there the glass showed as being about an inch of beins to the top." Did you make that statement at the last trial?

A. I might have, I cannot remember whether I did or not. I want to tell the truth as near as I can, that is all I want to do.

Q. Now, you say you can tell when the injector is working?

A. Yes, sir.

Q. Can you tell by the sound of the pipe?

A. Yes, sir.

Q. Where is that pipe located?

[34] A. It is located on the right side, if it is the injector o the right side that is working.

Q. Is it inside or outside of the cab?

A. It runs on the inside, I suppose; you can hear it.

Q. I don't ask you to suppose about it, Mr. Walton; you know about this engine, just tell the jury whether that pipe which you say you can hear the water in, is on the inside or outside of the cab?

A. It is on the inside of the cab.

Q. Where?

A. It is according to which injector is going.

Q. Where does it come inside the cab?

A. I don't know, I never pay much attention to it, but I know it is on the inside of the cab; I think it runs by the boiler head and over the top of the boiler.

Q. On the inside of the cab?

A. I think so.

Q. Are you sure of that?

A. I won't say for sure, but I am positive most; but I wont' say for sure.

Q. Where is the injector located?

A. It is on the inside of the cab on the boiler.

Q. In the boiler?

A. I never said in the boiler. I said it was on the inside of the cab on the boiler.

Q. On the boiler on the inside of the cab?

[35] A. Yes, sir.

Q. And that is a thing that you can hear singing and throwing water into the engine?

A. I suppose so.

Q. You suppose so?

A. Yes, sir.

Q. And it don't make any difference whether the window is closed or open on the right side, you can hear the injector working and the water running through the pipe because it is right on the inside of the cab?

A. Yes, sir.

Q. Now, do you know whether or not an injector can work and not be putting any water into the boiler?

A. Yes, sir.

Q. Can it be in operation and no water be going into the boiler?

A. It could do such a thing.

Q. It could?

A. Yes, sir.

Q. How could it do that?

A. If you turn it on and it don't catch it ain't putting no water in the boiler, but if you turn it on and it does catch, the water is going into the boiler.

Q. Where does the water go if it does not go into the boiler?

A. I don't know, but it just makes a steam or bubbling

[36] sound like.

Q. And what kind of a sound does it make when it is going into the boiler?

A. It makes a kind of a solid like sound, guggling.

Q. It makes a kind of a guggling sound then too?

A. Yes, sir; solid like.

Q. Who operates the injector?

A. The engineer is supposed to operate it.

Q. He has to work several valves in order to operate it?

A. I suppose he does.

Q. Do you know whether he does or not?

A. I know he works one, yes, sir.

Q. What valve does he work?

A. I never noticed any but one that puts the injector on.

Q. He only works one valve and you don't know what that is?

A. I wasn't familiar with them engines and I couldn't tell you.

Q. You weren't familiar with these engines and you couldn't tell?

A. No, sir.

Q. You don't know how many valves the engineer had to operate in order to put that injector to work?

A. No, sir.

Q. And you say that you are almost positive that the injector and the pipe leading from the injector into the boiler are on
[37] the inside of the cab?

A. Yes, sir.

Q. And they are right on the engineer's side?

A. There is two of them, two sets of injectors on the engine.

Q. The right one is on the engineer's side inside of the cab, and the left one is on the fireman's side of the cab, right inside of the cab?

A. Yes, sir?

Q. That is right, isn't it?

A. I suppose it is.

Q. How is the injector put on?

A. I don't know. I never put these injectors on; I was not familiar with that engine and I never had anything to do with that; that wasn't my line of business.

Q. How do you know that neither Mr. Andrews nor anybody else put the left injector on?

A. Because I was on that side all of the time.

Q. But you don't know what they do to put it on, how do you know it wasn't put on?

A. I know it wasn't on; I know that much.

Q. How do you know?

A. Because I could have heard it if it had been on.

Q. You say you don't know how the injector is put on on this engine?

A. I did know, but I forgot.

Q. You don't know how many valves the engineer has to
[38] operate in order to put it on?

A. No, sir.

Q. How high are the doors to the fire box in that engine?

A. I don't know, I never did pay much attention to it.

Q. Give us some idea of it.

A. I have no idea.

Q. Can't you give us any idea?

A. No; I don't remember how high the doors were, I cannot

remember.

Q. The door opened right near the bottom of the platform, or the floor of the cab, doesn't it?

A. Yes, sir.

Q. Now, can't you tell the jury how high that door is?

A. No, sir; I cannot.

Q. You cannot?

A. No, sir.

Q. You cannot give them any idea at all?

A. No, sir; I don't have no idea how high it is.

Q. You cannot tell them whether it is six feet high or two feet high?

A. You asked me how high it was; I don't know how high it was, but I know it is not six feet.

Q. When you are standing up there firing in front of that door is it as high as your knees, does it come up to your knees, the [39] top of the door?

A. I don't remember whether it does or not.

Q. You don't remember whether it does or not?

A. It might be higher than my knees and it might be lower, I don't remember.

Q. Do you think it is any higher than your knees?

A. I cannot say.

Q. Do you know whether it comes up as high as your waist or not?

A. No, it ain't that high I know.

Q. It isn't that high?

A. I do not suppose it is.

Q. So the nearest you can come to the height of that door is that it is somewhere between as high as your knees and as high as your waist, is that right?

A. How is that?

Q. That its height is somewhere between your knees and your waist?

A. I cannot say, it may be more than my knee and might be higher, I cannot say; it might be lower than my knee and might be higher, I cannot say; I don't know how high it is, I never measured it.

Q. Tell the jury how you see a crown-sheet in an engine; how can you look at it?

A. There is different ways to look at it.

Q. Tell them the different ways you can look at it.

A. If the engine is cool, you can stoop over and look up in there at it.

Q. If it is cool you can stoop over and look in there?

[40] A. Yes, sir; but when you are shoveling you have got to take the shovel and hold it up there to keep the heat off you.

Q. You cannot see it at all when the engine has fire in it without taking a shovel and holding it up in there and keeping the heat off you, can you?

A. I suppose you could with a light fire.

Q. With a light fire?

A. Yes, sir.

Q. Did you ever try to look at a crown-sheet in an engine at any time with a fire in it without the shovel, to keep the heat off you?

A. I never did have any particular use to look in there to examine it with the fire in it.

Q. You never did?

A. No, sir.

Q. What kind of a fire did you have on this trip just before this explosion?

A. I just had an ordinary fire, just enough to keep the steam up in that shape.

Q. Does it take just an ordinary fire or a pretty hot fire to keep up 185 pounds pressure of steam when you are pulling an eighty-car train?

A. I had a pretty nice fire in that engine.

Q. You had a pretty nice fire?

[41] A. Yes, sir; I did.

Q. Now, did you get down on your knees and look into that fire box any time after you left Roanoke?

A. No, sir; I did not.

Q. Now, I want you to tell the jury whether you can see any part of the crown-sheet in one of those engines without getting down on your knees and putting your head into the door and looking up in there?

A. I never did look in one of these engines and I couldn't say. I never did examine the crown sheet in any of them.

Q. Now, Mr. Walton, when did you see that crown-sheet from the time you left Roanoke until this explosion occurred?

A. When did I see it?

Q. Yes?

A. From the time I left Roanoke?

Q. Yes?

A. The next place I seen it was over here in Roanoke in that courthouse.

Q. The next place you saw it was over in Roanoke in the courthouse?

A. Yes, sir.

Q. And you did not see that crown-sheet at all from the time you left Roanoke until this explosion occurred, did you?

A. No, sir.

Q. And you could not have seen that crown-sheet by looking into that door with the fire you had in there without getting down on your knees and putting your head in the door and holding the

[42] shovel up there so that you could look at it, could you?

A. I cannot say, because I never looked into one.

Q. Now, what is between the fire box, the place where the fire is, and the crown-sheet?

A. What is between?

Q. Yes what is between the grate where you kept your fire, and the crown-sheet?

A. I don't remember.

Q. You don't remember?

A. No, sir.

Q. Do you know whether there is a brick arch in there or not?

A. There was supposed to be, but I don't know whether there was in this engine or not.

Q. You don't know whether there was one in this engine or not?

A. No, sir; I have forgot; I cannot remember.

Q. If that brick arch was in there, how far back does it extend to the door?

A. I do not remember; I cannot say. I do not remember whether there was a brick arch in this engine or not.

Q. You do not?

A. No, sir.

Q. Did you ever see one of these engines operated without a brick arch in it?

A. I do not remember; that is what I was telling you, I

[43] was not familiar with them engines.

Q. And you don't know whether these engines like the one that exploded, had a brick arch in them or not?

A. No, sir; I cannot remember.

Q. Now, you have seen brick arches in some of the engines,

haven't you?

A. Yes, sir; not in this class engine, though, that I remember; I cannot remember whether these had it or not.

Q. I wish you would tell the jury whether that brick arch interferes with your seeing the crown-sheet or not?

A. To a certain extent it would in them old engines, but this one that blew up, I cannot tell you.

Q. To what extent would it interfere with your seeing the crown-sheet?

A. You couldn't see the back part of it, that is about all.

Q. You couldn't see the back part of it?

A. Yes, sir; next to the flues.

Q. You can see it if you get down and put your head inside the door, can't you look around the brick arch?

A. In the old engines I do not suppose you would have to do that.

Q. Wouldn't you have to put your head close to the door and look around the brick arch to see the crown-sheet?

A. Not in these old engines, you wouldn't have to lay down and stick your head in there to see.

Q. What kind of engines are you talking about?

[44] A. There are different class engines; you are talking about these new engines; I wasn't acquainted much with them, wasn't familiar with them.

Q. The engine that we are talking about is the engine that we want to know something about.

A. I cannot tell you about that arch in that engine, if that is what you want to know.

Q. All right, you say you cannot tell whether this engine has any brick arch in it or not?

A. No, sir.

Q. Can you tell the jury how close you had to put your head to the door in order to see that crown-sheet at all?

A. I said I couldn't tell whether there was any arch in that engine or not.

Q. If there wasn't an arch in there would you have to get down on your knees and put your head close to the door in order to see the crown-sheet?

A. I don't know. I never looked in this engine, not for any crown-sheet.

Q. Isn't it a fact that you never saw the crown-sheet in this engine in your life?

A. I seen it at Roanoke.

Q. I mean before the explosion occurred?

A. No, sir; not to my knowing.

Q. You never did see it in your life?

A. Not to my knowing; only at Roanoke.

Q. If you never say that crown-sheet in your life and did
[45] not see it on this trip, how can you say whether that crown-sheet was red hot at any time on this trip or not?

A. I never said it was red hot on this trip; I never said it wasn't.

Q. If you never saw it in your life and never saw it on this trip, you don't know whether it was red hot or not, do you?

A. If it was red hot I suppose a man would have noticed it.

Q. If there was a brick arch in there would that be red hot?

A. I don't know; I never seen an arch; I don't remember the arch in these engines.

Q. You have seen arches in other engines, when the engine is in operation, with a brick arch in there, is that red hot when the engine is running?

A. I don't remember, it has been so long since I was on one I cannot tell.

Q. Tell the jury how you would have been able to notice that this crown-sheet was red hot if you did not see it at all?

A. How is that?

Q. How would you have been able to notice that this crown-sheet was not red hot if you did not see it at all?

A. That would have drawed your attention to it, if it had been red hot, and if it had not been you would not pay no attention to it.

Q. How would it call your attention to it?

[46] A. You would have seen something wrong if you happened to glance in there and it happened to be red hot overhead, you know something is the matter.

Q. Isn't the brick arch always red hot when you have got one in the engine?

A. I couldn't say.

By the Court:

He said he did not know about that.

Q. You don't know about that?

A. No, sir; I don't know.

Q. If you don't know about that, then how are you going to tell how you would know if that crown-sheet was red hot?

A. It would draw your attention if you happened to be firing and look up there and it would be red hot up there, as red as it was at the bottom.

Q. In all the firing that you did on this trip you stood up and opened your door and threw your coal into your fire box and you never looked into that fire box at all except what you could see in throwing your coal in, did you?

A. You would be bound to look in every time you opened the door but you wouldn't notice overhead as much as you would down at the bottom.

Q. Could you see overhead at all when you were standing [47] up there throwing your coal into this fire box?

A. There wasn't anything to draw my attention to look overhead.

Q. Isn't it a fact that the only thing you could see when you were shoveling coal into the fire box was the fire in the box along on the grate, that is all you could see, wasn't it?

A. I never paid no attention to anything; I was firing that engine like an ordinary fireman would, looking after the firing.

Q. How did you open the door?

A. By air, by a pedal.

Q. You put your foot on a pivot or something and the door flies open?

A. Yes, sir.

Q. And you would stand up there and shovel your coal in?

A. Yes, sir; I was firing the engine.

Q. And all that you saw of the fire box was when you would open the door and throw your coal in, you could see in the fire box?

A. Yes, sir.

Q. And you did not look up at all?

A. No; nothing drawed my attention up to look.

Q. How high is the crown sheet above the grate of the fire box?

A. I don't know, I am no expert; I don't know anything [48] in the world about it.

Q. Have you got any idea?

A. No, sir.

Q. You never looked into one of these engines at all?

A. I never remember looking into this kind of an engine.

Q. You never saw the crown-sheet in one of those new engines?

A. No, sir.

Q. So you cannot tell the jury how high the crown-sheet is above the top of the door?

A. No, sir; I cannot.

Q. And you never fired an engine in your life with a crown-sheet that was red hot?

A. Not to my knowing, or no other man.

Q. Something generally happens when it gets hot, don't it?

A. I suppose it would.

Q. You never saw a fire box in your life open when the crown-sheet was red hot over that fire box?

A. No, sir; not to my knowing.

Q. How do you know then what kind of a light you would see from that red heat of the crown-sheet?

A. If you would be firing an engine along the road and it would be red over the top as it was down at the bottom you would be bound to notice it and you would think that something ought to be put in up there.

[49] Q. Suppose there was a red hot brick arch in there up over your fire box, would that look the same as a red hot crown-sheet or would it look different?

A. I don't know; I never did pay any attention to neither one, a red hot arch or anything.

Q. And you don't know whether the arch over the fire box gets red hot or not?

A. No, sir.

Q. You don't know what kind of a light it gives if it does get red hot, do you?

A. What was the question?

Q. You don't know what kind of a light a red hot brick arch over the fire box gives?

A. No; I never did pay any attention to it.

RE-EXAMINATION.

By Mr. Hunt:

Q. I understood you to say that there was no difference in the glow in the fire box on that trip at any time up to the time of the accident?

A. None that I ever noticed.

(Witness stands aside.)

[50] F. A. RICHARDSON.

F. A. Richardson, sworn, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Hunt:

Q. What is your business?

A. An engineer.

Q. How long have you been an engineer?

A. Since 1907.

Q. Did you ever fire before you were an engineer?

A. Yes, sir.

Q. How long did you fire?

A. Four years, about that.

Q. What company are you working for?

A. At present I am with the Virginian.

Q. How long have you been at work for the Virginian?

A. Five years, or a little over five years.

Q. You have been engineer for this defendant Company for five years?

A. Yes, sir; five years and two months.

Q. Are you familiar with the class of engine that was run, the crown-sheet of which exploded?

A. Yes, sir.

Q. When Mr. Andrews was killed?

A. Yes, sir.

Q. Did you ever run one of those engines?

A. Yes, sir.

Q. Are you familiar with the injectors on them?

A. Yes, sir.

Q. You know how to work them, I reckon?

[51] A. Yes, sir.

Q. You would be in trouble if you did not?

A. Yes, sir.

Q. In turning on the injector, do you turn it on from the inside of the cab?

A. Yes, sir.

Q. The injector is located where—below the cab, isn't it?

A. Just below the cab, between the engine and the tank.

Q. Is that known as a Sellers Non-Lifting Injector?

A. Yes, sir.

Q. Is there any trouble for the fireman to tell whether or not that injector is throwing water into the boiler?

A. No, sir.

Q. Is there any trouble about operating it?

A. No, sir; none whatever.

Q. If you have got your valves open and you have got on 185 pounds of steam on the engine, where is it bound to throw the water?

A. It will practically put it in the boiler.

Q. What do you mean by that?

A. I mean that if the injector is working all right and properly primed, it will throw the water in the boiler.

Q. If the injector is in good working condition and properly primed and you have got the valve open, it is bound to put the water in the boiler?

A. Yes, sir; if you have got the right amount of steam and
[53] water it is bound to thrown it in the boiler.

Q. That is what you call priming?

A. Yes, sir.

Q. Can you tell from the difference in the sound whether the water is going in the boiler or not?

A. Yes, sir.

Q. You can sit in your cab with the windows shut and tell it, can you?

A. Yes, sir.

Q. Could you tell it when you were a fireman before you got to be engineer?

A. Yes, sir; that is the first thing a fireman learns.

Q. If in firing an engine, can a fireman in his act of stooping over to throw coal in, and in raking up the fire with his bar, can he see the crown-sheet or any part of it?

A. He can; yes, sir.

Q. If the crown-sheet was red hot will you tell the jury whether there would be a difference in the glow in that fire box?

A. It undoubtedly would; I never seen one red hot, but in my judgment—

By Mr. Hall:

(Interposing.) We object to that evidence and ask the court to strike it out.

By Mr. Hunt:

Did you finish your answer?

Witness:

I do not think I did.

Q. Well, finish it.

A. What was the question?

[54] Q. Read the question. (Question read to witness.)

A. There would be; undoubtedly there would be if the crown-sheet was hot. In addition to the fire you have in there you have also an arch and there would be an additional light there and heat to make it light.

Q. You have been running, I believe you said, this same type of engine?

A. Yes, sir.

Q. Do you recall when those engines first came on the line of the Virginian Railroad?

A. I do not believe I can; I never kept any record of them.

Q. I don't mean for you to give us the exact date, but do you know without telling the time, do you know when they came on the road?

A. No, sir; I couldn't say right now.

Q. Do you recall the fact that they were put on that line?

A. Yes, sir, indeed; they were put on our division—the third division they call it—when they first came here.

Q. And the time they came is that what you can't recall?

[55] A. No, I cannot recall that; I have got a record of it though.

Q. Will you state whether or not any of that same shipment of engines had a different type or kind of injector on it?

A. No, sir; not that I know of, or that I remember.

Q. Your answer is no to that question?

A. Yes, sir.

Q. Did you ever run this particular engine?

A. I do not think I did ever run this engine.

Q. The engine that you ran was identical in every particular, wasn't it, or supposed to be?

A. Supposed to be; yes, sir.

Q. Now, I will ask you to state whether or not you know how many engines came on this yard or to the Virginian Railway in that shipment?

A. I do not know, but I think there was ten or twelve; I do not remember; I never paid any attention to the amount of them.

[56] (Manuscript page 56 marked out.)

[57] (Manuscript page 57 marked out.)

[58] (Manuscript page 58 marked out.)

[59] (Manuscript page 59 marked out.)

Q. Are you familiar with the grade on the Virginian Rail-
[60] road from Roanoke to the point of this accident?

A. Yes, sir.

CROSS-EXAMINATION.

By Mr. Wingfield:

Q. You said that when the valve of the injector is opened and properly primed with a pressure of 185 pounds of steam, it will throw the water into the boiler; what do you mean by the injector being properly primed?

A. We have an injector that has got to be properly primed before it will go to work.

Q. Who does the priming?

A. The engineer.

Q. What does it consist of?

A. When the injector primes?

Q. Yes, sir?

A. All we do is to open a little steam valve called a jet valve.

Q. And opening that valve correctly is what you call prim-
[61] ing the injector?

A. Yes, sir.

Q. If you don't open it correctly—

A. (Interposing.) It won't prime.

Q. Even though you may get it to the proper distances? I mean by that, you mean if it is opened wide enough, but if you don't open it right it will not prime?

A. No, sir.

Q. So when an injector is open it does not necessarily mean that water is going into the boiler?

A. No, sir; no, indeed.

Q. How many valves does the enginees have to open and manipulate to make that injector throw water into the boiler?

A. Do you mean on what kind of an injector?

Q. On the Sellers non-lifting injector?

A. Two; but this ain't got that priming valve I was telling you about.

Q. As a matter of fact, on the class of engine that is involved in this accident, doesn't he have to operate three valves?

A. Not on a non-lifting; no, sir.

Q. Only two?

A. Yes, sir.

Q. You say that injector is not up on the boiler in the cab?

A. No, sir.

[62] Q. Is it down under the cab?

A. Yes, sir; right under the cab.

Q. On the outside?

A. Yes, sir.

Q. Under it?

A. Yes, sir.

Q. You say that a fireman by listening can tell whether his injector is properly throwing water into the boiler?

A. Yes, sir.

Q. It takes some experience to enable a man to do that, doesn't it?

A. It takes some little; yes, sir.

Q. A man who is not familiar with this class of engine and with this class of injector, could not tell at first whether his injector was working properly or not, could he?

A. Not right at first; he could not.

Q. He would have to acquire some familiarity with the engine and injector before he could tell whether it was working properly or not?

A. He certainly would.

Q. The fact that the window on the right hand side of the engine cab is shut, does that have any effect upon the hearing of the fireman and enabling him to tell whether or not the injector is properly working when the fireman is on the left hand side of the cab?

A. No, sir; it wouldn't hurt him, nothing of any conse-

[63] quence at all with the window shut; he don't get his sound from there.

Q. Where does he get his sound from?

A. It comes up from between the engine and the tank, so to speak; you see, from up under the engine like; you do not get any sound at all from out there; we do get a sound too, but that wouldn't have any great effect on it.

Q. Where does the pipe run that carries the water from the injector into the boiler?

A. It runs right up on top of the boiler.

Q. In the cab?

A. No, sir; outside of the cab, way ahead, at the head of the dome.

Q. It does not run through the cab?

A. No, sir.

Q. It runs outside the cab?

A. Yes, sir.

Q. And does it run low down outside the cab or high up?

A. It runs down underneath the cab, it misses the foot board of the cab.

Q. So it is underneath the platform or floor on which the fireman stands?

A. Yes, sir.

Q. And it is not in the cab at all?

A. No, sir.

Q. I believe you said you never saw an engine being operated while the crown-sheet was hot?

A. I am speaking of this certain engine, about this pipe.

[64] Q. Yes, I am talking about that too.

A. We have engines with injectors in the cab, but I am speaking of this certain class of engine.

Q. On this class of engine the injector is under the cab?

A. Yes, sir.

Q. And outside of it?

A. The injector is down under the foot board of the cab and the feed pipe alslo is down there.

Q. I believe you said you never saw a crown-sheet being operated with fire under it when it was red hot?

A. No, sir.

Q. Or hot?

A. No, sir.

Q. So you can only conjecture how it would look?

A. I couldn't tell you how it would look, I just only suppose how it would look.

Q. How long would it stay hot that way and how long could you look at it red hot that way before it would come down?

A. It would depend on what you done to it.

Q. I will change the form of the question. I am asking you when an engine is being operated under the regular working pressure and when the crown-sheet was red hot and nothing is done to it, how long would it work that way?

[65] (Manuscript page 65 marked out.)

A. What is the question?

Q. Assuming that the engine is working at the regular
[66] pressure, and being worked in the regular manner of engines of this class, and the crown-sheet is red hot, how long will it work that way before the crown-sheet goes down?

A. I do not believe I could tell you.

Q. Would it not be a very short time?

A. I do not think anybody living could answer that question and tell how far it would go.

Q. Would it go for more than a minute?

A. Minutes, hours or days; no man living can tell how far that crown-sheet would go in that condition; a human being couldn't tell it; it may go an hour or two hours, it may not come down at all; no human being can tell about a crown-sheet in that way; no one can tell anything about it. That is the way I can give you an answer, and I do not believe that anybody else could tell you. They can surmise but they cannot tell how long it will go.

Q. Is there a brick arch in this class of engine?

A. Yes, sir.

Q. Where is that arch?

A. It is just above the grates, commencing there and runs on an angle back to the back end of the fire box.

Q. And it is between the fire and the crown-sheet?

A. Yes, sir.

Q. Does that brick arch get red hot?

A. It undoubtedly does.

Q. Does it get white hot?

A. It depends on your fire; if you have got a good, nice fire it will get white hot; it changes as your fire does.

Q. With that arch red hot or white hot, how can you dis-
[67] tinguish the glow from the crown-sheet when the crown-sheet is also red hot?

A. Of course, that would have a tendency to have more light in the fire box; you see, by bringing this crown-sheet in with the brick arch and the fire in there would have a tendency to create more light undoubtedly.

RE-EXAMINATION.

By Mr. Hunt:

Q. I don't know whether I have got you exactly clear or not, and I don't know whether the jury did, but I understand you to say that this brick arch in there would cover up the crown-sheet?

A. No, sir; I didn't say that.

Q. You did not mean to say that?

A. I did not say that.

Q. A man can look in the door notwithstanding the brick arch and see the naked crown-sheet?

A. Yes, sir.

Q. Is the operation of the injector a simple or complicated proposition?

A. It is very simply; it is a non-lifting Sellers injector that we are talking about; we have some that are complicated, but not this injector.

Q. If, assuming that the injector was on from a point shortly after leaving the Roanoke yard and stayed on continuously and the, water glass showed a gain in water between those points, would
[68] that show conclusively that the injector was throwing water into the boiler?

A. Yes, sir.

RE-CROSS-EXAMINATION.

By Mr. Wingfield:

Q. Can a fireman stand up in front of his door—that is, in front of the fire box door—and see the crown-sheet?

A. You mean standing up?

Q. Yes?

A. No, sir.

Q. What position does he have to get in to look at the crown-sheet?

A. You would have to stoop some.

Q. How much?

A. Considerable; it would depend on how tall he was.

Q. I mean a man of average height?

A. He would have to bend himself practically half way down.

Q. As a matter of fact, he would have to get on his knees, wouldn't he?

A. Not necessarily; no, sir; he would bend down something like this (indicating).

Q. You have got your head down on a level with your knees, haven't you?

A. Yes, sir; just about level with my knees.

Q. Does the heat disturb you in looking in that place?
[69] A. In a big heavy fire, it does; yes, sir.

Q. How do you usually go about looking at the crown-sheet and how do you protect yourself from the heat when you have

a hot fire?

A. Sometimes I hold my hand up like this (indicating), and sometimes I use a shovel. Sometimes I take a piece of waste in my hands and hold it like this (indicating), and as a general thing, I always take a look at that before going out when the fire is not so hot and you can see, as a general thing, the heat is not great.

Q. But to examine it when you have a good brisk fire you have got to protect yourself from it, haven't you?

A. Yes, sir.

Q. And a man just pitching coal in couldn't see the crown-sheet, could he?

A. Not unless he would make an effort to see it; he could not see it by just pitching coal in.

(Witness stands aside.)

At this point, at the request of plaintiff, it is admitted by the defendant that this was an interstate train and that the plaintiff's intestate was engaged in interstate commerce at the time the explosion occurred.

It is admitted by both plaintiff and defendant that the plaintiff in this case has duly qualified as administratrix of the decedent.

Court takes a recess until 2 o'clock p. m.

[70] TUESDAY, OCTOBER 6, 1914—AFTERNOON SESSION.

Continuation of the evidence in chief on behalf of plaintiff.

MRS. MAUDE L. ANDREWS.

DIRECT-EXAMINATION.

By Mr. Hunt:

Q. You are the widow of Mr. Andrews who was killed in this accident on the Virginian Railroad on the 14th of November, 1912, I believe?

A. Yes, sir.

Q. How long had you been married?

A. Seven years.

Q. How many children have you?

A. I have four.

Q. What are their ages?

A. Two, four, six, and eight.

Q. Your little boy that was with you in court, is that your oldest child?

A. Yes, sir.

Q. Mrs. Andrews, where were you married?

A. At Amherst courthouse.

Q. I believe you qualified as administratrix of your husband?

A. Yes, sir.

Q. Will you tell the court and jury whether or not you had any other means of support other than the means furnished you by your husband's work?

Q. State whether or not your husband in his lifetime sup-
[71] ported you and your children?

A. Yes, sir.

Q. What salary did he make?

A. He made between $170.00 and $200.00 a month.

Q. Was it so much a day or run?

A. I think so much a day.

Q. Do you recall the amount per day?

A. Between four dollars and five dollars a day, I think, as well as I remember.

Q. His profession was that of an engineer?

A. Yes, sir.

Q. Now, you may state what kind of a husband was he, so far as your children were concerned; was he loving, careful and painstaking husband for the welfare of his children, or not?

A. Yes, sir.

Q. You may state whether or not he was solicitous concerning his children, as to whether or not they should have an education?

A. Yes, sir; he was.

[72] Q. Have they any other means of support now other than such as you can give them?

Q. Mrs. Andrews, you may state what kind of a husband Mr. Andrews was and what kind of a father he was as to providing the comforts and necessities of home life?

A. He was a most kind father and loving husband; his first thoughts were of home.

By Mr. Wingfield:

We ask that the answer be stricken out as not responsive to the question, and as improper.

(Question withdrawn.)

Q. I will withdraw that question and ask another question and will also withdraw the answer as to the loving husband and ask that

the court will permit me to withdraw the same from the consideration of the jury.

By the Court:

The question that I allowed you to ask with reference to being an affectionate husband, do you want me to sustain that objection?

By Mr. Hunt:

Yes, sir.

By the Court:

Gentlemen of the jury, all those questions with reference to the fact of his being a loving and affectionate father, are withdrawn and you will not pay any attention to the questions and the answers of the witness; just blot them out.

Q. Now, I will ask you whether or not his earnings went to the support of his wife and children?

A. Yes, sir.

Q. You may state whether or not from his earnings he cared for and took care of the necessaries and comforts of his home and family?

A. Yes, sir.

[74] Q. Now, I will ask you whether your husband at your home did things around the house which could only be done by him or some one else employed for that purpose?

A. Yes, sir.

Q. What was the nature of the things which he did around the house with reference to repairing anything that was to be done or looking after the family or premises?

A. You mean his daily work?

Q. Yes?

A. He would help me with the children and he would just do anything that came to hand.

Q. Now, you may state whether or not he taught his children and instructed them in a literary way and a moral way?

A. Yes, sir.

Q. You may state whether or not he was with them at home and he was ready with his counsel and advise to his children and to his family?

A. Yes, sir.

Q. What was the age of Mr. Andrews?

A. He was 38.

Q. When was he 38?

A. He was 38 in January before he died.

Q. And I believe you told us that his earning capacity per day was between four dollars and five dollars?

A. Yes, sir.

[75] Q. You said it ranged from $150.00 to $200.00 a month, was that dependent upon the number of days that he got in during the month?

A. Yes, sir.

Q. If he got in a full month it ran up as much as $200.00, did it?

A. Yes, sir.

Q. And that would make something over $6.00 a day, wouldn't it, Mrs. Andrews?

A. Yes, sir; it would.

Q. You may state whether or not he was industrious and ambitious, and a sober man?

A. Yes, sir; he was.

Q. Was he ever ready to answer the calls to go out on his runs when they were made?

A. Yes, sir.

CROSS-EXAMINATION.

By Mr. Hall:

Q. Mrs. Andrews, you testified in this case once before, when it was tried, didn't you?

A. Yes, sir.

Q. Do you remember what you said on that occasion as to how much your husband earned?

A. I said anywhere from $125.00 to $175.00 to $200.00, didn't I?

Q. And you say now from $150.00 to $200.00; why do [76] you make the difference?

A. Well, he did not always make the same.

Q. Sometimes he made as low as $125.00 a month, didn't he?

A. I suppose he did.

Q. What was the condition of Mr. Andrew's health?

A. It was very good at times; of course, occasioally he would lay off with sick headaches and things of that kind; he wasn't always the most healthful man.

Q. Didn't you say before that his health was poor and he lost a good deal of time on account of sickness?

A. I don't know that I did say that.

Q. Wasn't it a fact?

A. I won't say that he lost a good deal of time; perhaps he would lose a trip or two a month, or something like that, and it was on account of sickness more or less.

Q. Did you say his health was not good?

A. Not very.

Q. You had been married to Mr. Andrews seven years before this accident to him?

A. Yes, sir.

Q. How many railroads had he worked for during that time as an engineer?

A. I don't know exactly.

Q. Where was he working when he was married to you?

By Mr. Hunt:

I do not see the relevancy of these questions.

[77] Q. Do you know where Mr. Andrews was employed when you married him?

A. He was running on the Atlantic Coast Line.

Q. Where did he go from the Atlantic Coast Line?

A. I think he went to the Norfolk & Western.

Q. Then where did he go from the Norfolk & Western?

A. To the Virginian.

Q. Didn't he go from the Atlantic Coast Line to the Louisville & Nashville?

A. Yes, sir; he did.

Q. How long was he employed there?

A. I couldn't tell you just how long.

Q. And then he went from the Louisville & Nashville to the Norfolk & Western?

A. Yes, sir; that is right.

Q. And from the Norfolk & Western to the Virginian?

A. Yes, sir.

Q. So, during the seven years that you were married to him he was employed as an engineer on four different railroads; that is correct, isn't it?

A. Yes, sir.

(Witness stands aside.)

[78] ARTHUR SCRIVENOR.

Arthur Scrivenor, sworn, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Staples:

Q. What is your business?

A. An engineer.

Q. Tell the jury what experience you have had; what line of work you have been engaged in that brings you in touch with locomotive boilers and kindred questions?

A. When I first left school I went to the Barrow Hematite Steam & Iron Works in Lancashire, England, where I was employed in firing boilers, and gas producers. From there I went to North Greenwich where they had an experimental station, firing boilers with coal and with oil; they had about seven or eight boilers there; and from there I went to the Unity Iron Works, and from there I came to this country and I was employed at the American Locomotive Works, then the Richmond Locomotive Works, in the drawing office, and in 1893, I went into business for myself doing engineering work, and for several years I have been occupied in what is called power plant work; familiar with the stationary boilers particularly, and had a good deal to do with boilers and engines, electrical apparatus and things of that kind. In that time I had charge of manufacturing plants, foundry work and machine shops and so forth.

Q. Have you examined the crown-sheet over there in this case?

A. Yes, sir.

By Mr. Hall:

I do not think the witness has qualified as an expert on locomotive boilers, and I would like to ask him a few questions along that line.

By the Court:

Very well.

By Mr. Hall:

Q. What experience have you had with locomotive boilers, Mr. Scrivenor?

A. You mean in running locomotive boilers?

Q. No; I mean in knowing anything about them?

A. Only while I was in the locomotive works and what I have seen with my eyes at other times since, and what I have read about them.

Q. You were a draftsman in the office of the locomotive [79] works?

A. Yes, sir.

Q. You had nothing to do with the construction of boilers?

A. Except to go to the shop and see how things were carried out and that they were carried out.

Q. To see that they were constructed according to the plans you drew?

A. Yes, sir; I mean going in and getting the details, and I was brought in touch with the work going on in the shop. I do not mean to say we were put in the place of the foremen, because we were not.

Q. You had nothing to do with the construction of boilers actual boiler work?

A. No, sir.

Q. And your experience in connection with locomotive engines or repairing locomotive engines?

A. No, sir.

Q. And you experience in connection with locomotive [80] engines ended in 1893?

A. Any practical experience that I had with them; yes sir.

Q. How long were you in the drafting room in the Richmond Locomotive Works?

A. From December, 1891, until they closed in 1893, I have forgotten the month.

By Mr. Hall:

That is all I desire to ask the witness, but we think the witness is clearly incompetent to testify as to locomotive boilers.

By Mr. Staples:

We think he is qualified to speak as to that.

By Mr. Staples:

Q. I will ask you whether or not in your work in the locomotive works at Richmond you were necessarily brought in contact with the actual manufacture and building of boilers?

A. Yes, sir; I saw them built every day I was there.

By Mr. Hall:

Q. What kind of locomotives were built in 1893?

A. You mean what types?

Q. Yes?

A. They were older types than are built today.

Q. They were entirely different types of engine?

A. Very much different. The first radial stay fire box, I think, was built at the Richmond Locomotive Works while I was there, and it was designed by the master mechanic of the C. & O. Railroad.

Q. And the types of locomotive engine in their size and
[81] the kind of crown-sheets and stay-bolts have entirely changed since 1893?

A. I do not think the kind of crown-sheet and the kind of stay-bolts have changed very much since the radial stays and radial crown-sheets were started, but I think the type of locomotive has changed a great deal.

By Mr. Staples:

Q. Mr. Scrivenor, did the work that you have done require knowledge of the principles which would be applicable in determining from an inspection of a crown-sheet of an exploded locomotive, a failed crown-sheet, as to the cause of the failure?

Defendant objected.

By the Court:

Ask him what experience he has had to enable him to determine that.

Defendant excepted.

A. Ask that question again, please.

Q. (The question is read to the witness.)

A. You use the word "require", I cannot say my work has required that knowledge, but one acquires that knowledge by pursuing that work.

Q. Do you think you are familiar with those principles of mechanics and physics which would be involved in determining that?

A. I think so.

By the Court:

Go ahead.

[82] Q. Mr. Scrivenor, have you examined the crown-sheet in this case, lying over there in view of the jury?

A. Yes, sir.

By the Court:

I suppose it is admitted that that is the crown-sheet?

By Mr. Hall:

Yes, sir; that is the crown-sheet.

By Mr. Staples:

The defendant produced this crown-sheet as the crown-sheet that was blown down when the explosion occurred and when Mr. Andrews was killed.

By Mr. Hall:

We object, if your Honor please, to the witness answering any questions with reference to this crown-sheet as an expert witness on the ground that he has not shown himself qualified to answer as an expert witenss.

By the Court:

That is to save making any exceptions hereafter?

By Mr. Hall:

Yes, sir.

By the Court:

Just note the objection and objection overruled.

By Mr. Hall:

I want to ask one question. Have you ever examined a crown-sheet of a locomotive that failed from low water?

Witness:

No, sir.

By Mr. Hall:

Did you ever see one in your life before you saw this crown-sheet that had failed and was buckled down as this crown-sheet is?

Witness:

I didn't catch that, please read it.

(Question read to witness.)

A. Not unless I saw it on a scrap heap. I mean I may
[83] have seen one but I cannot say definitely at any particular place that I did see one.

Q. You cannot say definitely that you ever saw a crown-sheet in your life that was blown out on account of low water?

A. I cannot say it was blown out on account of low water.

Q. Can you say that you ever saw a crown-sheet blown out in any way in an explosion of an engine?

A. I did not see the explosion, but I have seen damaged engines and damaged fire boxes.

Q. I asked you about locomotive engines.

A. I am speaking of locomotives.

Q. You do not know whether any of them were damaged by an explosion caused by low water or not?

A. No, sir.

By Mr. Staples:

Q. Has your experience made you familiar, that is, your experience and study, made you familiar with the effect upon iron of heat, that is, the effect upon its holding power, and the effect upon its appearance?

A. I have had considerable experience from its appear [84] ance.

Q. Have you made a considerable study of the effect of heat upon its holding power?

A. To some extent.

Q. Have you examined the crown-sheet in this case?

A. Yes, sir; I have examined it as well as I could.

Q. I will ask you whether or not the appearance of that crown-sheet shows anything that would necessarily indicate that the explosion was caused by low water?

A. I do not think that the appearance of the crown-sheet itself is positive proof that there was low water.

Q. Do you think that there is anything that necessarily indicates that at all from the appearance of the crown-sheet?

A. What might have been low water might have been other things too.

Q. In other words, it might have been low water or it might have been caused from other things, is that what you mean?

A. That is my opinion.

Q. When you say low water you mean absence of water over the crown-sheet at the time it failed, don't you?

A. That is what I understand is meant by it.

Q. If the sheet had been white hot at the time of the failure would it have had the color and appearance that it now has?

A. I do not think it would.

Q. What would have been the color in your opinion?

A. A brownish red.

Q. What would have been the appearance of the surface, that is, as to smoothness or roughness?

A. I think the surface would have been rougher than it is.

Q. Do you or not think that if the sheet had ever been white hot that the surface could have been brought to its present condition without special treatment?

A. I do not think it could have been without special treat-
[86] ment, because it would have had a coating of oxide of iron which would require a reduction in order to produce a blue color.

Q. How hot could the sheet have been and retain its present appearance?

A. I couldn't say definitely, as I have no records of my own covering that point.

Q. From your study of the subject?

A. I will state that I have read in "Treatise on Heat" and such things, that I should say a Fahrenheit heat from 1000 to 1200 degrees.

Q. If that crown-sheet is supported by one and one-eighth inch button head bolts, what would you think would have been the holding power of those bolts if they had been in perfect condition at dull red heat, the pound pressure, that they could have withstood?

Defendant objected.

By Mr. Staples:

We call on the defendant now to produce the bolts.

By the Court:

I understood that they were produced at the same time that they produced the crown sheet.

Q. What material do you call this; have you any name for it wrought iron or steel, or what is it—Mr. Slayton?

By Mr. Slayton:

Special stay-bolt iron, fibrous wrought iron.

[87] Q. I will predicate my question then upon that bolt being made of fibrous wrought iron or special stay-bolt iron.

By Mr. Wingfield:

I would like to ask the witness a question before he answers the one asked by Mr. Staples.

By Mr. Wingfield:

Q. Isn't stay-bolt iron of varying qualities, or various degrees of fineness and various degrees of tensile strength and toughness?

A. Yes, sir; I would say it would be; it would depend who manufactured it and what they made it out of.

By Mr. Staples:

I am talking about first-class material.

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A. I have not made any definite tests as to the holding power of a red hot bolt myself, but according to Kent, who is considered an authority, I see it on the table here, I have it myself the best Lancashire iron which is considered first-class fibrous iron on the other side, it is supposed to increase its strength up to a temperature up to 500 or 600 degrees and then lose its strength down to a limit—I think Kent says something like seven or eight thousand pounds, that is, per square inch. I know that is bright red heat, dull red heat; it would be safe to say it would stand seven thousand pounds.

Q. Is it or not true that at a dull red heat that a bolt should stand somewhere in the neighborhood about half of what it should stand under water of four hundred or five hundred degrees?

A. It might be a little less than that.

[88] Q. If the stay-bolts in this engine were stays four by four with these button-head bolts, what would be the pressure upon each bolt when the steam in the boiler was up at popping-off point or its maximum?

A. What was the steam pressure?

Q. 185 pounds.

A. 185 pounds multiplied by 16.

Q. That would be 2960, wouldn't it?

A. I don't know; you can figure it.

Q. I wish you would multiply that so you can answer the question?

A. 2960.

Q. Do you, or not, think there would be any doubt about the ability of those bolts to stand ordinary boiler pressure at a dull red heat?

A. I do not know about those bolts.

Q. I mean if in good condition; I am assuming that they were in good condition.

A. I would say that iron would stand it, or good iron.

Q. If the bolts are composed of first-class iron?

A. That is what I mean.

Q. If that is the case, do you think there would be any doubt about their ability to withstand that pressure, assuming that everything was in good condition and that the material was first-class, at a dull red heat?

A. I should think so, but my thinking is simply based on

[89] the figures I gave you just now.

Q. What would be the pressure that they would have at

the maximum pressure of the boiler?

A. They would have 3000 pounds on each bolt.

Q. And they should withstand what?

A. At least twice that.

Q. Now, if heated to a red hot, what do you think those bolts should withstand, what pressurs?

A. What do you mean, a bright red heat or what red heat?

Q. Yes, a bright red heat.

A. It would be less than at a dull red heat.

Q. How much less do you think?

A. Say about four or five thousand pounds per square inch.

Q. Your opinion there then is predicated upon the idea that the material is first-class and all of the bolts are in good condition?

A. I regarded the strength given of first-class iron of that diameter or that area.

Q. Assuming, as I have stated, that everything was in first-class condition?

A. Yes, sir.

CROSS-EXAMINATION.

By Mr. Hall:

Q. Mr. Scrivenor, I wish you would look at that crown-sheet and tell the jury which side of it was the side next to the water and which side was the side next to the fire?

[90] A. I think this was the side next to the water.

Q. And the other side was the side next to the fire in the fire box?

A. Yes, sir.

Q. Why do you think that?

A. Because the pressure is on this side.

Q. Is there any other way you can tell?

A. The other side is slightly discolored.

Q. What discolored it?

A. The heat.

Q. Did it have any water on it when the heat discolored it that way?

A. I couldn't tell you whether it did or not, possibly it did not.

Q. It did not?

A. Possibly.

Q. Can you look at that crown-sheet and tell the jury whether or not it ever had fire under it with no water on top of it? In other words, whether it was ever burned in the common parlance among

boiler makers?

A. I have never seen a boiler, just one exactly that same color with water on the top. That must be my reply, because I cannot say that I ever saw a sheet that I positively knew there was no water on the top.

Q. Do you know what the indications are of a burned crown-sheet?

A. Of a burned crown-sheet?

[91] Q. Yes?

A. Scale, for one thing.

Q. What kind of scale?

A. It depends on the temperature at which the metal was burned.

Q. Where do you see that scale, which side of the crown-sheet does that scale appear on?

A. I am speaking of the oxide of iron on the face of the crown-sheet, the fire side.

Q. What color does a burned crown-sheet have then?

A. If it only gets a small quantity of oxygen and a small quantity of air in contract with it, it may be blue; if very highly heated and gets very much air in contact with it it will be red.

Q. I want to hand you a bolt head and ask you whether you think that was ever burned or not, that is, heated to a red hot heat?

By Mr. Hunt:

We object to that question because we do not know what bolts they are.

A. It certainly was when it was made in the first place.

Q. Suppose this head is off a bolt like this, that had a perfectly square shoulder like that, when it was put into the crown-sheet. Now I want to ask you whether or not that bolt head shows that it was ever heated after it was put into the crown-sheet?

A. It certainly had indications that it was, by its shape

[92] Q. To what extent was it heated in order to have taken that shape?

A. I do not know to what extent it was.

Q. Cannot you give us any idea what degree of heat it was? You have been telling about the different degrees of heat, what effect they have on iron. Now, tell us about what degree of heat that bolt was heated to be put in that shape if it was in the crown-sheet?

A. I should say by the color of that bolt that it was heated to a dull red heat.

Q. To a dull red heat?

A. Yes; that head.

Q. What holding power would it have at a dull red heat?

A. The head or the bolt?

Q. The bolt. In other words, what strain would have been necessary to break that bolt off, if it was broken off, if it was heated to a dull red heat?

By Mr. Staples:

I object to that question because a bolt will stand more pressure if it is a good bolt than a sorry one.

By Mr. Hall:

I will let Mr. Scrivenor answer the question both ways.

Q. You can assume it was a good bolt or a sorry bolt.

A. I cannot tell what pressure it would have broken at. I do not know what the condition inside that head was at the time, I mean the fibrous structure.

Q. Assuming that it was good, what strain would have [93] been required to break it at a dull red heat?

A. According to what information I have, the strain would have been, as I said just now, about seven or eight thousand pounds.

Q. It would have stood fifty per cent of the original strain at a dull red heat?

A. That is a dead straight pull.

Q. If that bolt head was forced in that position by the crown sheet, and I will show you this one, I want you to tell the jury what shape that crown-sheet would have been in when that bolt head took that position. Assuming that the bolt head was originally square there as this one is.

A. I would say that if that bolt head was square with the bolt, that when that metal actually and finally parted that crown-sheet was not in its original position.

Q. What shape was it in?

A. I cannot say what shape it was in, but it was certainly on askew.

Q. In askew all around the bolt?

A. No, sir.

Q. What part of it shows it was not in askew?

A. It appears to me to have been upset, like that (indicating), when it parted.

Q. What do you mean by saying it appears to be upset like that?

A. I mean the whole sheet was at that angle when that head finally parted from the bolt, because that bolt appears to be pointing down in this direction (indicating). To me the angle at
[94] which that sheet lay in relation to the axis of the bolt was as that finger is to that hand there (indicating).

Q. Was the sheet bent around or curved down as the bolt head is?

A. I don't know whether it was or not.

Q. How could the bolt head have gotten in that shape if it was not bent down?

A. Oh, if the sheet wasn't bent down?

Q. Yes?

A. It could not unless the bolt had not been flat on the sheet at first.

Q. It could not unless the bolt head had not been flat on the sheet at first?

A. Yes, sir.

Q. Did not the sheet necessarily take the shape that that bolt head has got at a time when the bolt head was hot, in order for the bolt head to have that appearance?

A. Are you referring to the angle made by that head, or just the curve of the head?

Q. No, sir; I am referring to the slope.

A. Of the head itself?

Q. Of the convex shape of the head itself, as differing from the shape, the straight shape it has got on this perfect bolt.

A. Yes, sir; I think it did.

[95] Q. You think the sheet around that bolt had the same shape it has got?

A. Approximately.

Q. Didn't it have to have the same shape in order to force the bolt head in that shape?

A. No, I think you could work it out some way by which the sheet would roll up one way or have a continuing motion, but I do not think it did; that is a possibility; I think it is more likely the sheet was in approximately that shape at that point.

Q. Did you ever see an engine that had a burned crown-sheet that had not failed; I mean a locomotive engine that had a burned crown-sheet that had not failed?

A. No, not a locomotive.

Q. You would not know how to tell whether a locomotive had a burned crown-sheet or not, would you?

A. I think so.

Q. How?

A. I should say partly by the color and partly if there was any bagging, there might be some slight bagging between the bolts.

Q. Could it be burned slightly and not bagged?

A. Superficially.

Q. Did you ever see one burned slightly that did not bag?

A. You mean a locomotive?

Q. Yes, sir?

A. I just said I never saw a locomotive crown-sheet [96] burned.

Q. Is there any other way you could tell whether a crown sheet was burned, except by bagging and the color?

A. I don't know.

Q. You don't know?

A. No, sir.

Q. Now, can you go over there and look at that crown-sheet and tell the jury whether there is any bagging there that indicates whether it was burned or not at any time in its history?

A. At this top corner of this end, there is some indication of slight bagging between the bolts.

Q. Just at one corner of it?

A. I didn't notice it at any other corner.

Q. Suppose you go over and take a good look at it and come back and tell us whether there is any sign of that crown-sheet having been burned at any time or not.

(Witness examines the crown sheet.)

A. As I said before, the spaces in between the bolts at this particular corner show indications of some bagging or more bagging than they do at any other point on the crown-sheet between the bolts

Q. Isn't there some bagging between the bolts at all points on the crown-sheet?

A. There is slightly.

Q. And there is some bagging at this corner?

A. It appears to be so.

[97] Q. How do you explain to the jury that bagging?

A. At the corner?

Q. All over it; the bagging that you say you find there, what caused it?

A. I would say it was one of two things, either that the plate became heated, which I said I did not think it became hot enough to bag like that, therefore it is my opinion that some of the bolts had

been broken previously and that the sheet was not in condition to sustain the pressure, and possibly more bolts may have broken at that time and finally it gave way.

Q. I wish you would go back and answer my question. It is a very simple question; and tell the jury how that bagging which you have just stated is on that sheet, was caused?

A. The initial bagging between those small bolts?

Q. Yes?

A. That may have been caused by a hot sheet.

Q. Now, you say it may have been caused by a hot sheet?

A. Yes, sir.

Q. Do you know any other way it could have been caused except by a hot sheet?

A. No, sir; I do not know any other way, up in that corner.

Q. How about the bagging at other places on it, do you know any other way that could have been caused except that the sheet was hot?

A. That may have been caused when the sheet was cold [98] after the bolts gave way.

Q. The bagging between the bolts?

A. No; I did not say the bagging between the bolts; that is very slight; I am speaking of the whole bagging.

Q. I am talking about the bagging between the bolts. I understood you to say that in a certain corner of it that there is more bagging than there is elsewhere; that all over the sheet there is a certain amount of bagging between the bolts. Now, confining yourself strictly to that bagging between the bolts, I want you to tell the jury how else that could have been caused except by the sheet being burned?

A. I think that the bagging between some of the bolts could have been caused by simply some of the bolt heads holding the sheet back while the rest of the sheet was going forward.

Q. I want you to take any four bolts there now that you can find and explain to the jury how the bagging between those four bolts could have been caused in any other way except when the sheet was hot?

A. I do not think that it could have been—you take it between any four bolts?

Q. Isn't there bagging between every four bolt heads on that sheet?

A. I haven't tried it with a level or anything of that kind.

Q. Can't you see it with the eye?

A. There appears to be a slight bagging; yes, sir.

[99] Q. Between every four bolt heads on that sheet, and you say you do not think it could have been caused in any other way except when the sheet was hot, is that correct?

A. I did say that—slight bagging between any four bolts.

Q. Now, could that sheet have been hot and that bagging have been caused without water on top of it?

A. Only if there was oil or scale on top of it, it can then.

Q. What position does the sheet set in the engine or boiler?

A. Fore and after?

Q. Yes, sir?

A. This is the foreward end.

Q. Is it horizontal or does it slope?

A. I think there was a slight slope; it differs in different engines, I think.

Q. So then, in order for that bagging to have been caused when the sheet had water on top of it, it must have had oil over the whole top of that sheet—oil or scale over the whole top of that sheet?

A. I said if there was oil.

Q. Yes?

A. Ask the question again, please.

Q. My question is this: If the bagging that is in that sheet occurred with water on top of it, then it must have had oil or scale over the entire top of the surface of that sheet?

[100] A. I cannot say that is true, because I have seen photographs of boiler plates which were bagged locally, and the cause of the bagging was attributed to oil on the inside surface of the plate, and those baggings were oval in shape.

Q. They only bagged where the oil was on the plate?

A. Presumably.

Q. My question is this: that if this sheet was bagged in that way, that is, from having oil on it, then it had oil all over the entire surface?

A. Is that the entire surface of the crown-sheet?

Q. I mean the entire surface of that part of the crown-sheet.

A. No; I do not say that would be necessarily so.

Q. How could that bagging have been caused between each one o fthe four bolt holes without oil on it, as you have said, unless it did not have water on it?

A. I did not say it could. You asked me to tell the jury if there was any other possible way in which the plate could get hot with water on it, and I said possibly with oil, or possibly with scale; I did not say there was oil on it.

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Q. Have you ever seen one that did get hot and bagged becau it had oil or scale on it?

A. I have not actually seen the plate itself, but I ha
[101] seen photographs of the plate.

Q. What form was the plate?

A. It was exactly if it had been depressed, or you might s a semi-egg shape with slight flanging off where the curve starts.

Q. What part of the sheet did that take places, that bagging

A. At the bottom nearest the fire, longitudinal of the boiler.

Q. And nearest the fire?

A. Right over the fire.

Q. And it did not extend over any part of the sheet; I mean say, it was just a local place there?

A. I did not measure it because I did not measure the pho graph of the boiler; but judging from the length of the boiler, it w probably eighteen feet, which is the average length of 150 horse pow boiler; that is the type of boiler it was, and I would say it was eig teen inches long, one of them; there were two or three of them on t same sheet.

Q. That sheet was sloping, wasn't it?

A. The slope of a boiler, if properly set—the boiler I am spea ing of is one inch in eighteen feet.

Q. And the oil was at the lowest point?

A. No; it was at the higher end of the boiler; it was on t forward end of a horizontal return tubular boiler, and that end is inch higher than the back end; some people set them t
[102] inches higher.

Q. Your sheet was curved, wasn't it?

A. Certainly; it was a circular sheet.

Q. Where was it, at the highest point of the circle or the low point?

A. The lowest point of the circle, my recollection is there w three of them; I am sure there were two, one was approximately the lowest point, and the other one by the side of it.

Q. Do you find any indication of oil or scale on this sheet have caused the bagging?

A. I do not see any.

Q. You would see them if they had caused it, wouldn't you?

A. I don't know that I would; I never examined inside of boiler while it was being bagged; it is an impossibility to see wh indications are inside of a boiler at the time of the bagging.

Q. You never saw one and you don't know?

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A. No; and I don't think anybody else has, while it was being agged, but afterwards they have.

Q. I suppose plenty of other people have seen them immediately after they were bagged?

A. I have no doubt they have.

Q. They could tell then?

A. They might; I don't know whether any indications were left y the oil or not.

Q. You don't know anything about it except having
[103] heard that that might be so, and having seen these photographs; you don't know anything about it except that?

A. About what?

Q. About the bagging of boilers by having oil on them?

A. Since I have been doing a good deal of work in trying to ounteract that for people for the last four years, I do know a little it about it, by filtering water and putting in apparatus to counteract he oil.

Q. Where does the oil come from?

A. The exhaust steam from engines—stationary engines, I am peaking of, of course.

Q. You wouldn't have any such condition as that in a locomotive?

A. Not unless you used your exhaust steam to carry it back nder the tank, and I do not know whether they did or not.

Q. Did you ever see a locomotive that did that?

A. No, sir.

Q. You never heard of that?

A. I don't know what a locomotive does with the exhaust steam except what goes up through the stack; they do use some for heating but I don't know whether any goes into the tank or not.

Q. Will you look at that bolt head and tell how hot it was?

A. Only as I did before. (Witness examines same.) Do you mean when it broke or when it was made?

Q. I mean when it was broken or when it was last heated
[104] A. I don't know.

By Mr. Staples:

Is that also one of the bolts that came out of this engine?

By Mr. Hall:

No; but I want to test the accuracy of his knowledge as to what he can tell from the appearance of a bolt.

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By the Court:

Keep the bolts separate.

By Mr. Hall:

They are all marked.

A. My answer was I did not know what temperature it was at which it broke.

Q. Can't you tell the jury whether it was a red heat, a cherry red or a white heat?

A. No, sir; because it may have been a cherry red or a white heat before it broke and broken afterward. What I mean is: the color itself is no indication of the strain at which it broke.

Q. All right. I will put the question to you this way: Suppose that bolt was broken when it was hot, and that it has not been heated since it was broken, tell us how hot it was.

A. Or before?

Q. Yes?

A. I couldn't tell you, because it might have been heated to a high heat before then.

Q. You mean in forging it?

A. I do, or for any other reason.

[105] Q. What is the difference between the temperature of those two bolt heads, to which they were heated?

A. I do not know that there is any difference between the two one appears to have a little more scale on it than the other.

Q. Which one?

A. This one (indicating).

Q. What does that indicate?

A. Simply the conditions under which it was heated, and I do not know what they were.

Q. How do you know it indicates the conditions if you don't know what they were?

A. I mean I do not know what the conditions were under which that bolt was heated.

Q. Which one of those bolts appears to have been heated to the highest degree of temperature, the conditions being the same in both cases?

A. Except the temperature?

Q. Yes?

A. I would think this one had.

Q. Why?

A. From its appearance, roughness.

Q. You mean the one that has got the nut on the end of it is the one you think was heated the hottest?

A. I do not say it was; I say it has some indications that might lead you to think it had happened. It would not lead me to think it was forged at a lower heat or had been subjected to a lower heat.

[106] Q. At what degre of temperature did I understand you to say that fibrous wrought iron would retain 50 per cent of its strength?

A. I don't think I said that.

Q. Or somewhere in that neighborhood?

A. About 1000, I think that is what I said.

Q. At a red heat?

A. That is a dull red heat.

Q. When you referred to Kent and said according to Kent that iron got stronger up to about 500 degrees and then from that time on it lost its strength, was that right?

A. Yes, sir; I think so.

Q. Now, Kent lays down on page 454 that a dull red heat is 700 degrees Centigrade or 1292 Fahrenheit, doesn't he?

A. I don't know the exact figure; I think I said 1000 to 1200 is my recollection.

Q. I will ask you to look at that book and see if Kent does not say on page 454 that a dull red heat is 1292 degrees Fahrenheit?

A. Yes, sir.

Q. Now, I will ask you if Kent does not say on page 383 that at 1300 degrees Fahrenheit fibrous wrought iron only has a tensile strength of 16.5 per cent of its original strength when cold?

A. The original strength being what—13 per cent. I think Kent also gives the original strength per square inch for a fibrous bolt of 46,000 pounds; 13 per cent of that would be approxi-

[107] mately about 6000 pounds.

Q. I don't care what kind of bolts you take; I asked you the simple question if Kent does not lay it down on page 383 of the work that you have referred to that at 1300 degrees temperature Fahrenheit, that fibrous wrought iron only had 16.5 per cent of its original strength, when cold?

A. It says 16½ per cent for 1300 degrees.

Q. That is the strength it has?

A. That is what it says here.

Q. Now, at a dull red heat, which Kent lays down as 1292 degrees, it would only have about 16.5 per cent of its original strength, wouldn't it?

A. Yes, sir; according to that table.

Q. Suppose it was a cherry red, Kent says on page 454 that the degree of temperature would be 1652 degrees, doesn't he?

A. Cherry red heat, 1652.

Q. I would like for you to look at the table on page 383 and tell what percentage of its tensile strength it would have at a cherry red heat?

A. 7 per cent it says here.

Q. Only 7 per cent?

A. Yes, sir.

Q. What figure was that you gave awhile ago as to the percentage of strength that it had when it was heated to a dull red heat?

A. 10 to 12, I think I said.

[108] Q. 10 per cent to 12 per cent?

A. No; that was the degree of temperature; I think I said about six or seven thousand, at dull red heat.

Q. I am not asking you about any particular bolt—how much any particular bolt will hold—but I wont to know if you did not make the statement awhile ago when you were being examined by counsel for the plaintiff that iron heated to a dull red heat had a certain percentage of its original strength?

A. I do not recollect the question exactly that way.

By Mr. Hunt:

He gave it in pounds instead of percentage.

By Mr. Hall:

He gave it both ways, I think. Didn't you?

A. No; I really do not remember that; it may be so, but I do not remember it.

Q. I may be mistaken about that, but the fact is when you heat it up to a dull red heat it only has 16½ per cent of its original strength?

A. According to that table; yes, sir.

Q. If you heat it up to a cherry red heat it only has 7 per cent of its original strength?

A. According to that table; yes.

Q. You do not dispute the correctness of that table, do you?

A. I have no better one.

Q. You think that is right?

[109] A. Simply because I have made no tests myself. Others have made tests possibly that I have not seen and they may

give different degrees.

Q. So, when a bolt gets heated up to a dull red heat, it has lost considerable of its strength, hasn't it?

A. Yes, sir; it certainly has lost some of its strength.

Q. It has lost 84 per cent of its strength, hasn't it?

A. Yes, sir. I base that on the assumption that the original strength of that bolt is about from forty-six to fifty thousand pounds per square inch, the original tensile strength; the locomotive works now use a factor of safety on all their stay-bolts of 4½, and that conforms with the usuage they had when I was there, on which we used ten thousand pounds per square inch on every bolt we put in a locomotive where it was on a strain.

Q. If a factor of safety of 13.3 is used, that is, if a bolt is that many times stronger than it is necessary to be to stand the strain, that is enough, isn't it?

A. 13.3 per cent?

Q. No; 13.3 times. In other words, if a stay-bolt is made to stand 13.3 times more than the strain that is put on it, that is a factor of safety enough?

A. I should think so.

Re-Examination.

By Mr. Staples:

Q. Mr. Hall has read you some tables here showing an experiment or experiments by a man named Coleman as set out in Kent's "Mechanical Engineer's Pocketbook." I will ask you if on the same page and on the bottom of the preceding page, 382, of that work, the author does not say that James E. Howard's tests, made in

[110] April, 1890, about nine years after the test that Mr. Hall has just spoken about, show that the strength of wrought iron increases with temperature from 6 degrees up to a maximum at from four to six hundred Fahrenheit, the increase being from 8000 to 10,000 pounds per square inch, and then decreases steadily until the strength of only 6000 pounds per square inch is shown at 1500 degrees Fahrenheit. Is that statement or not contained on page 383 of that work?

A. Yes, sir; it is. Do you want me to read it?

Q. That, then, states it ought to sustain a pressure at 1500 degrees Fahrenheit of 15,000 pounds, doesn't it?

A. It states so there.

Q. And 1500 degrees, according to the table on page 454 is practically a cherry red heat, isn't it, an incipient cherry red heat,

which is between?

A. Yes, sir; between the two.

Q. I will ask you whether or not the experiments which demonstrated that iron at the strength which I have just read were made before or after the experiments which demonstrated the strengths which Mr. Hall read to you?

A. Yes; the experiments referring to the increase in the strength up to five and six hundred degrees is the James E. Howard test, "Iron Age", April 10, 1890, and the other one, the table giving the percentage is the journal of the Franklin Institute of

[111] 1881.

Q. And I will ask you whether or not it does not state in the fifth column of that table from which Mr. Hall read to you, or it does not show that previous tests in the Franklin Institute which showed that iron had considerably stronger temperature than that test there showed, that is, as far as the test was carried in 1832 and 1836?

A. Yes, sir; they are greater.

Q. In other words, the tests which were made before and since that time, according to this book, have developed a greater holding power for fibrous wrought iron than the table from which Mr. Hall read, isn't that true?

A. Yes, sir.

Q. Now, Mr. Scrivenor, I will ask you whether or not it

[112] is possible for, and not a common occurrence, that when a crown-sheet is burned by low water, that an engine on a previous trip will let the water get low and in that way the sheet become heated and produced a bagging, and then the engine cool off and be heated afterwards with those baggings in the crown-sheet, and operated afterwards with those baggings in the crown-sheet? Is it not generally understood among scientific men that that is a fact, that a large number of locomotives run in that condition, in a condition with bags in between the bolts?

[113] Defendant objected.

By the Court:

As I understood this witness, he stated in answer to a question by Mr. Hall that bagging had been made at different times.

Witness:

Yes, that is what I said.

By the Court:

It might have been by previous heating?

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Witness:

Yes, sir.

By the Court:

Mr. Hall, you brought that out on cross-examination, and I think he has a right to examine him on it; but the form of the question is objectionable, and I will sustain the objection as leading.

Q. From the best of your opinion, did the bagging in between the bolts on that crown-sheet occur at the time of the explosion or prior thereto?

A. You mean in the corner of the sheet or all over the sheet?

Q. All over the sheet, all of the bagging that you see there.

A. I think that there are indications that it was caused before.

Q. Now, Mr. Scrivenor, what did you mean by a bolt laying flat up against the crown-sheet?

A. The bolt head was faced that way, and when the bolt
[114] is pulled by every part of the face of that bolt head that exerted an even pressure upon the sheet.

Q. Suppose the crown-sheet is not tapped at a direction which is perpendicular to the longitudinal axis of the bolt, what is the effect of that when those button-head bolts are screwed in?

A. One side will press against the sheet and the other will not.

Q. Suppose you screw it real tight under those conditions, will that have the effect of cracking the head or not?

A. It is possible to.

Q. If it does, doesn't it weaken the bolt?

A. Yes, sir; it would weaken the bolt.

Q. I wish you would state what effect is sometimes produced upon the bolts of a crown-sheet by the fireman opening the box or opening the door and allowing cold drafts to go in?

A. The expansion of the fire box is due to heat, and if cold air is allowed to strike upon the crown-sheet of any kind of a boiler, it must contract it, if it changes its temperature at all; that subjects the bolt to unequal strain and sudden strain sometimes, and it weakens the bolt in some cases and in some cases it breaks them. In case cold air strikes it, it causes a sudden contraction, an unequal contraction of the sheet, which has been previously heated.

Q. Now, isn't it true that a bolt which fits in those holes
[115] yonder of the crown-sheet, when both are in good condition, should stand practically the same amount of strain without the bolt pulling through; that is, without the crown-sheet giving way or the bolt head breaking? In other words, is not the capacity of the

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sheet and the bolt to withstand pressure or strain practically the same, or as near as they can get them the same?

A. Without a fracture?

Q. Yes?

A. I should say they would be; I do not know definitely exactly what proportion it is, but I would say they are about alike.

Q. I will ask you whether or not the rings around the holes of that crown-sheet there could not have been made just as well when the sheet was cold as when it was hot; I mean the little de-
[116] pressions?

A. Some of them have been faced.

Q. What do you mean by "faced"?

A. I do not know whether they were or not; I don't know whether they could have been. I do not think that the boiler pressure on the bolt would have made a depression in the head of the bolt if it had been cold.

Q. I am talking about, with the added strain of going down, when that strain is added to the ordinary normal boiler pressure, that is, the momentum, the starting to give way?

A. No; I do not think so.

Q. You do not think what?

A. I do not think it would make any difference, or there would be any added strength.

Q. I want you to take this bolt and see if you can find a single hole in that crown-sheet that looks like it would fit into it, and corresponds to the way that bolt is.

A. You mean to try every hole?

Q. Take it over there and see if you can find any holes you think that will fit in.

(Witness goes to crown-sheet and tries the same.)

A. There is one here that will very nearly fit it, but not quite

Q. You do not see any, then, that it absolutely fits in?

A. No, sir; I said here is one that it very nearly fits in, but I could not get it into the hole on account of a bit of burr or thread on the face of the bolt head, and there is also on the edge of the bolt a face or facet which looks like it had been struck by a hammer
[117] which would not fit in any on the sheet, I mean in any hole on the sheet; that is what you asked me, whether there was anything that would fit that space, and I said no.

Q. If there had been filings or some sort of metal that had been left on the interior of that boiler by the people that made it, wouldn't that have caused the bolt to be damaged, that is, pieces of

iron or something laying on the crown-sheet inside?

A. I do not understand the question.

Q. Read the question to the witness, Mr. Morris.

(Question read to witness.)

A. I remember the question, all right; if you mean particles of metal left in the finished holes here (indicating) or do you mean just loose stuff scattered around?

Q. I mean when the men worked in the boiler, if they cut out and left pieces of metal in there like a piece of metal as big as that (indicating), or one or two pieces of scrap or bolts or borings?

A. I do not know what effect it would have on the crown-sheet.

Q. Don't you think that would cause the bolts to be damaged?

A. I don't know that it would.

Q. Do you know whether that would have the same effect
[118] as scale if it got covered over with little mud or something of that kind?

A. No; I do not.

Re-Cross Examination.

By Mr. Hall:

Q. You say if metal and stuff like that is left there you do not think it would have any effect on the bolts?

A. I said I did not know that it would.

Q. You said awhile ago that it might cause bagging in the crown-sheet, metal or scrap or oil?

A. I said oil or scale; I do not mean metal scale.

Q. That might cause the bagging of the crown-sheet but that wouldn't effect the bolts?

A. I said it would cause an overheating of the crown-sheet.

Q. But that wouldn't effect the bolts. In other words, my question is this: if there was some oil—

A. (Interposing.) If for any reason it is overheated, the head of the bolt or the part of the bolt inside that sheet would also be heated.

Q. So the oil then would have to be right under the bolt head and around the shank of the bolt in order for it to cause the bolt to be overheated, wouldn't it?

A. No.

Q. You went over and looked at that sheet there very carefully and tried to put those bolts in, did you expect to find that they would fit in that sheet now?

[119] A. I did not expect to, because there was a burr in that

bolt head and I did not think it would go in anyway, and it did not go in.

Q. Would you expect any other bolt head to fit the contour of that sheet now—bolt heads that were broken off in that explosion, I mean?

A. I cannot say that I certainly would expect it, because I never had to try the same thing before.

Q. You never had to try the same thing before?

A. To fit the bolt head into the hole.

Q. And you don't know whether you would expect it or not, do you?

A. I beg your pardon.

Q. You don't know whether a man who is experienced in dealing with crown-sheets that have failed and drawn up as this one is, would expect to find bolt heads to fit or not, do you?

A. If the sheet had not bagged any more after the bolt parted it would fit.

Q. If it had not bagged any more after the bolt parted it would fit, you say?

A. Yes, sir.

Q. If it did bag more after the bolt parted, it wouldn't fit would it?

A. If it did not?

Q. Yes?

A. If the sheet and the bolt—

[120] Q. (Interposing.) No, I say if it did bag more afterwards.

A. Then it is possible for the whole sheet to bag and still one portion of it to retain the same curvature it had before it bagged.

Q. You say that is possible?

A. Yes, sir; I do.

Q. Do you mean to say that it is possible for that sheet, which was perfectly straight across—

A. (Interposing.) No, you did not ask that question. May I explain myself? You said is it possible or did I think that a bolt would fit if the sheet bagged after the bolt had parted, still continued to bag after the bolt had parted, that is, I think the question; and I said it is possible for one portion of the plate to retain the same curvature it had at the time the bolt parted, even though the whole sheet generally bagged still further, there is only one small portion of the surface of the whole sheet.

Q. You think that is possible?

A. Yes, sir; because it is the holding power of the bolt that makes the sheet bag and gives it the curvature at that point.

Q. What is the shape of that sheet when it is in its normal condition?

A. Slightly arched.

Q. How much is it bent down from its true position by the explosion?

A. A little bit more than—if you put a straight edge
[121] across those two edges and measure down to the bottom of the bagging, you will find—

Q. (Interposing.) Roughly speaking, isn't it ten or eleven inches lower than it was in its true position and forced down there by the explosion?

A. Not far from that, I should say, just looking at it.

Q. Suppose you had this bagging between the stay-bolts before the stay-bolts gave way, and then when the stay-bolts did give way the whole sheet was forced down ten or twelve inches, what effect would that have on the bagging between the stay-bolts?

A. The individual bagging between the stay-bolts?

Q. Yes; would it increase or diminish the bagging?

A. I would say if the plate was cold the bagging would stay there, it would be still burned; if the sheet was hot, it would stretch out.

Q. And the bagging would be less, wouldn't it?

A. I should think so.

Q. Wouldn't it be less if it was cold?

A. It might possibly disappear altogether.

Q. If it was hot?

A. Yes; hot enough.

Q. And if it was cold, how would you get it forced down ten or eleven inches without straightening out some of that bagging between the stay-bolt holes?

A. I think that is a question entirely of the actual struc-
[122] ture of the fibers in between those bolt holes before that movement starts, and I do not think we are able to answer that question exactly without an actual test between the bolt holes and the sheet as a whole. I would say that steel in a cold state can be stretched.

Q. I do not deny that. I asked you this: If that sheet was cold, when it was practically a plain surface like this, and there was bagging between the stay-bolts and then you forced that down ten or eleven inches in the center from its true position, what effect would

that have on the bagging between the stay-bolt holes?

A. I do not think it would straighten out the bagging between the holes.

Q. You do not think so at all?

A. It might do it a little, but I do not think it would straighten it out altogether.

Q. If you got a certain distance across the length of that sheet, and it is forced down ten or twelve inches, you have got to increase that distance, haven't you?

A. Yes, sir; but good steel has an elongation of nearly thirty per cent; it is over twenty per cent in ordinary steel.

Q. When you stretch it that way, don't that have a tendency to remove the bagging?

A. I mean, a part of it can stretch without all of it stretching.

Q. When those have stretched, that would reduce the [123] bagging between the bolt holes, wouldn't it?

A. I should think it would generally, but not altogether.

Q. Generally but not altogether, it would not entirely remove the bagging, but it would lessen it some, make it less than it was before it was forced down that way?

A. It is all assuming that it is cold, though, all the time.

Q. Certainly. I am talking about a cold plate; when you heat a plate you say the bagging might be taken entirely out of it or practically so, didn't you say that?

A. I thought the plate could be made hot enough so you could stretch it to take the bagging out, because there is not the same resistance to the tightening of the fibers.

Q. You say this bagging you thought was caused before this sheet failed, didn't you?

A. I don't remember whether I did or not.

Q. Didn't you say that you thought the bagging between the stay-bolt holes was caused before the explosion?

A. Yes, sir; I did; I was referring particularly to this bagging in the upper corner.

Q. Now, if the bagging between the stay-bolt holes was sufficient to put these bolt heads which I have shown you in the shape they are in, I want to ask you whether or not that crown-sheet would have leaked when the water was afterwards put on it, under pressure?

A. I did not say that the bagging did do that. You are [124] speaking of the bagging between the bolt holes.

Q. Read my question to the witness.

(Question read to witness.)

A. You ask if the bagging had put them in that shape?

Q. Yes?

A. What I referred to was the preliminary bagging.

Q. The bagging between the stay-bolt holes, I am talking about, you said the bagging you saw there was produced prior to the explosion in your judgment?

A. I said it might have been.

Q. Might have been?

A. Yes, sir; that is my recollection.

Q. If it might have been produced prior to the explosion, and these bolt heads are the ones that broke off from the bottom part of that crown-sheet, the bagging was sufficient to put the bolt heads in that position or shape, wasn't it?

A. I did not say so.

Q. I asked you if it was not?

A. I do not think it would be.

Q. Why not?

A. Because the indications up in this left hand corner of it where I call it a small bagging between the bolt holes, does not deface or deform the metal around the hole at all.

Q. All right, if the heads of these stay-bolts were like that, with a square shoulder on them, then how could they have gotten in this shape?

A. If they had been heated?

[125] Q. If they had been heated with the crown-sheet on top of them, wouldn't the crown-sheet have had to bag sufficiently to force them into that shape?

A. Yes, I think that the crown-sheet must have practically taken that shape.

Q. In order to make the bolt heads that shape, didn't it?

A. If they were straight like that before.

Q. If they were straight like this perfect bolt which I showed you before, then in order for them to have gotten in this shape the crown-sheet must have bagged and taken that shape around the bolt?

A. Approximately; I think I said that before.

Q. Now, if that heating was done before this explosion and they took this shape before the explosion, then I ask you whether or not there would have been a leakage around those bolt heads when water was put on it in that engine under 185 pounds of pressure?

A. If they had been in that shape?

Q. Yes?

A. If the threads had not been a good fit there most probably

would have been leakage.

Q. Would the threads have been a good fit if they were in that shape, if the crown-sheet was stretched and bagged to that extent?

A. No, I do not think they would if the crown-sheet had been stretched to the shape of those bolt heads; I do not think the threads would have been a good fit.

Q. And if water had been put on it when in that shape
[126] under 185 pounds of pressure, you think there would have been bound to have been leakage around these bolt heads?

A. If they had been in that shape

Q. That is what I said, if they had been in that shape.

A. I think so.

Q. I believe you say you live in Richmond, do you?

A. Yes, sir.

Q. How do you happen to be up here today?

A. I was requested to come here.

Q. By whom?

A. By Mr. Staples.

Q. And you came up here to testify as an expert witness in this case, didn't you?

A. Yes, sir.

Q. And you had not seen this crown-sheet or bolt heads or anything about it before you came here?

A. No, sir.

By Mr. Staples:

Q. But you had it described to you, didn't you?

A. Yes, sir.

(Witness stands aside.)

[127] L. S. RANDOLPH.

L. S. Randolph, sworn, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Staples:

Q. I wish you would state your occupation and experience in matters involving the application of the principles involved in this case as you have just heard Mr. Scrivenor testify?

A. I would say that I am a machinist by trade, having learned my trade in the shops of the Baltimore & Ohio Railroad. After three years spent there, I graduated as a mechanical engineer at the Stevens Institute of Technology, Hoboken, after which I was for two and a

half years chief chemist and engineer of tests for the New York, Lake Erie & Western Railroad, now the Erie. After that I was for eighteen months superintendent of motive power, the title then was master of machinery, of the Florida Railroad & Navigation Company, with offices at Fernandina, Florida. After that for two and a half years I was in a similar position with the Cumberland & Pennsylvania Railroad at Mount Savage, Maryland; for about two and a half years as engineer of tests and chief chemist for the Baltimore & Ohio Railroad at Baltimore. A year with the Baltimore Electrical Company, of Baltimore, Maryland, as electrical engineer; since which time, about twenty-one years, I have been professor of mechanical engineering at the Virginia Polytechnic Institute, having more or less charge of their power plant and doing considerable outside consulting work.

Q. Do you teach mechanical engineering questions, and
[128] principles involved in this case?

A. Steam boilers and railway engineering, and railway machinery, both of those subjects.

Q. Have you examined the crown-sheet in this case?

A. I have—this one?

Q. Yes, sir?

A. Yes, sir.

Q. I wish you would tell the jury whether or not there is any indication that that crown-sheet went down from the absence of water over it at the time?

A. At the time when the big bag occurred?

Q. Yes, sir?

A. I can see no indication of an absence of water there.

Q. If the sheet had been very hot at the time of the failure would it have the color that it now has?

A. It depends on what you call "very hot". I have seen several bag that way, where they were unquestionably very hot, nearly white hot, and they were always red. Furthermore, the surface was rough, and there was no sign of what we call mill scale on it. If you will notice there is a brown or dark blue scale on that, what we know as mill scale.

Q. You mean that was made there at the time it was manufactured?

A. At the time it was rolled.

Q. Is that mill scale destroyed by the intense heat?

[129] A. Yes, sir.

Q. If the sheet had been at white heat, or extremely hot

would the surface have presented the same appearance it now presents?

A. No, sir; not in my opinion.

Q. In what respect would it have differed?

A. It would have been rough and reddish in color.

Q. Would it have required special treatment to make it look like it does now?

A. Yes, I think so.

Q. What do you mean by special treatment?

A. Rerolling, or restretching, or probably reheating to get that red scale off and it might have brought it back to the blue for awhile then it would have oxidized very quickly.

Q. How hot do you think the sheet could have been and retained the appearance which it now presents?

A. I do not think that has ever been beyond the dark red.

Q. At what time do you think it probably was heated a dark red?

A. The bagging there, the little bagging between the bolts indicates that it has been heated to a dark red sometime in the past; it is difficult to say just when. Prior to the time the main bag was made.

Q. Prior to the time of the failure of the crown-sheet?

A. Yes, sir. I ought to say to the jury in that connection that there is not sufficient evidence here to properly check that opinion. We have nothing but a piece of iron here; there is no—except for the one set of rivet holes in here—there is nothing to say what its position was, it may have been over on one side or the other side

[130] It was evidently apparently near the flue sheet, but outside of that I cannot say whether it was more down on one side of the fire box than the other, and therefore, just the location of those bags, it is difficult to say whether they were due to mud or oil, or sometime previously, low water.

Q. Suppose some sort of metallic substance, or pieces of iron or bolts had been left in there by the manufacturers, and had laid on top of that sheet, would that have had the effect of making it bag probably?

A. I cannot imagine how anything of that kind would have affected it.

Q. You do not think that would have affected it?

A. I cannot imagine how it would have affected it.

Q. But you think mud or oil might cause it, without the absence of water from the sheet?

A. It might cause it.

Q. Now, what is the tensile strength of fibrous wrought iron 1⅛ inch bolt, at the temperature of boiling water, with 185 pounds

of pressure, approximately?

A. Ordinarily good grade of stay-bolt iron?

[131] Q. The best you can get?

A. It runs fifty thousand cold; I never made any test at steam temperature.

Q. What should that bolt withstand at a dull red heat?

A. What is the size of the bolt?

Q. 1⅛ inches.

A. Threaded, button head bolt?

Q. Yes, sir?

A. Somewhere in the neighborhood of eight or nine or ten thousand pounds.

Q. You mean each bolt should withstand that pressure?

A. Yes, sir.

Q. To how many pounds pressure is one of those bolts subjected with the maximum pressure of the boiler 185 pounds?

A. Those are four by fours—something under three thousand.

Q. Sixteen times 185, or 2960 pounds?

A. Yes, sir.

Q. What pressure should those bolts stand at bright red heat according to reported tests that you have studied?

A. About seven or eight thousand pounds.

Q. Then at bright red heat, as I understand you, the bolts of which that boiler was made, if they had been in good, perfect condition, should have stood about eight or nine thousand pounds pressure, or two or three times the pressure of the boiler?

A. Two or three times the steam pressure on it.

Q. When the safety valve was popping off?

[132] A. Yes, sir.

Q. Then, is it true or not, that the bolts in that boiler could have been heated to a more intense heat than bright red, in order for the failure to have been caused exclusively by absence of water on the crown-sheet?

A. Yes, sir.

Q. That is, if all the bolts had been in good condition?

A. Your question says exclusively?

Q. Then, I understand you to mean, if all the bolts had been in good condition and the failure had been caused by low water alone, it would have to have been heated to a higher temperature than bright red?

A. Yes.

Q. I show you here a bolt head, which you will see is broken

off up in the head, in a concave way—here are five or six bolts, all of which are broken off in the head. If those bolts came out of that boiler, and were broken at the time of the failure, I will ask you to state to the jury what that method of breaking indicates.

A. To explain to the jury—have you got a large full-size stay-bolt here?

Q. Here is one that is threaded. (Hands same to witness.)

A. When those are put in, they are screwed into the sheet and then a wrench is put on here and they are screwed down so tight as to twist that off. Let the jury examine those, as to the points of them (shows same to jury).

Q. I wish you would explain to the jury the method of
[133] seating those bolts, which have resulted in their being cracked by tight pressure in screwing them up to the crown-sheet?

A. You see your screwing them here, you have got the pressure of the thread there (indicating) one way, and the underside of this head here, just like any ordinary bolt, and you screw it down like this, and it tightens it and puts the strain on the bolt, and that strain comes between that point there, its maximum is there, between that point and the head. That is always very great, and the practice is a little different, as well as I can get at it, some relying on the fit of the thread there to keep the leakage, others on this pressure right around in here, to fit there. Sometimes, and this looks as if it had been intended, a copper wire or something is put around in that groove to stop the leakage. Now, under those circumstances, that puts a heavy strain way out to this edge here, then if there is any distortion, that puts it still greater, and a comparatively light degree of heat may have caused that to break in there. Now, in regard to that, one curious thing that occurs in regard to iron and steel both, and I could best describe it by an experiment which was made, and where I first saw it. A piece of steel, used for boilers, and I have seen the same thing occur with iron, this piece of steel was about that long and about that wide (indicating), and possibly three-eighths or half an inch thick, it was heated on one end and turned over and folded down flat
[134] heated to more than bright red, almost white heat, the other end was cold, turned over and folded down, cold in between, it was heated to a black heat, what we call black heat, and the slightest attempt to bend that cracked it, so that at black heat, both iron and steel are likely to crack. The steady straight-way pull on it does not always show it up, but it is brittle when cold or when quite hot, and would take an amount of movement in there that it would not when black hot, say just under a dark red. We do not know exactly what

that temperature is, I have never found it, but somewhere about that temperature. Now, that would cause that to break off, even when that thread there is usually considered strong enough, if it fits well to hold the load.

Q. You mean, if I understand you, and I don't know whether I got that very clear or not, that when this is screwed up very tight against the crown-sheet, and a bad fit is made of it, if the sheet is heated to a cherry red temperature, the expansion of the crown-sheet causes that to crack off?

A. Yes, sir; it will cause it to crack right down there, and furthermore, of course, if it bears unevenly on one side or the other the strain is entirely put on one side and that makes it crack.

Q. And some of those bolts, as I understand you to say, might be completely cracked off and drop down into the fire?

A. Yes, sir.

[135] Q. Is that illustrated in the difference between these two bolts, one of which was produced here, not having been in the fire, and this other one here, as to the different method produced that way?

A. I do not see very much difference in those, except the one that was not in the boiler has a little blue scale on it yet.

[136] (Manuscript page 136 marked out.)

[137] (Manuscript page 137 marked out.)

[138] (Manuscript page 138 marked out.)

By Mr. Staples:

Q. Are you familiar with the Sellers non-lifting injector, the type used on the engine in question in this case?

A. I saw one for a few moments in Roanoke last spring.

[139] Q. You are familiar with the principles upon which injectors generally work, are you not?

A. Yes, sir.

Q. The injector which you saw was the one that Mr. Slayton showed you at Roanoke, and represented to be identical with the one in question here?

A. I think it was the one on that engine.

Q. I wish you would explain to the jury whether or not that is a simple thing that the engineer can work with ease, and whether or not there ought to be any mistake made?

A. Yes; it is simple, and there is a difference of opinion in regard to them. A non-lifting type must be below the level of the water in the tank so that the water runs to it. Now, the
[140] lifting type is above that level and is usually either in the cab or close to the cab. I have some objection to the non-lifting type, for it is a little difficult to hear and out of reach, and I have had some trouble with it, in operating myself I always had some difficulty and I could not operate them as well as I could the lifting type, but a great many of the best railroads in this country use them and use them straight along, and the fact that the non-lifting type seems in the last few years to have come into service, I should say it was a good injector.

Q. An engineer can tell easily enough whether it is working and putting water into the boiler, can he not?

A. I never had much trouble except sometimes on dark rainy nights, it is a little difficult to tell, but we used the non-lifting type on the Erie, and I had some difficulty there telling, but generally by either putting your hand on the feed pipes or on the lever, you could feel the vibration or generally hear it.

Q. If the injector breaks, the steam escapes?

A. Yes, sir; down underneath, where sometimes they put that valve, and that is one of the dangers, they have got it so that it runs into the ash pan so as to keep the waste water in the ash pan
[141] and in that case the steam goes into the ash pan and can be seen with difficulty. If I recollect, I think the one here, that tell-tale one is outside, so that the steam went out and the man could look out of his window and see whether his injector was working or not.

Q. Can you hear the noise of escaping steam when the injector does not work?

A. I doubt very much whether you could hear the noise as much as the hum of the injector working.

Q. Have you ever operated one of these Sellers non-lifting injectors?

A. I operated one that time, that is the only type I ever operated, this type (indicating).

Q. If the glass water guage was in good, perfect condition at the time it was turned over to the engineer at Roanoke, could it have been possible for scale to have been deposited on it in such a way as to cause it to register erroneously an hour or so later?

A. You will have to define what you mean by scale, the question as stated there seems to indicate that you mean lime salts, which

are deposited from the water. I do not see how it would be possible for those lime salts to close up that guage in an hour or so, if it had been in anywhere near its proper condition when it left Roanoke.

[142] Court takes a recess until tomorrow morning, Wednesday, October the 7th, 1914, 9:30 a. m.

[144] OCTOBER 7, 1914, 9:30 A. M.—MORNING SESSION.

Continuation of the evidence in chief on behalf of the plaintiff.

L. S. Randolph, resuming the stand.

Direct-examination continued by Mr. Staples:

Q. Professor Randolph, state whether or not the condition of the pocketing between the bolts on that crown-sheet indicates that the sheet was covered with water when it failed?

A. I think so; yes, sir.

Q. The end of the crown-sheet over there where the rivet holes are is the highest part, isn't it, in the engine?

A. That is what I understood, that was the part next to the flue sheet.

Q. The part this way is the highest part?

A. Yes, sir; the part next to the flue sheet, which would be the highest part.

Q. I want you to come over here and look at this crown-sheet (witness does so). As I understand it, when that crown-sheet is in the engine, it is on a slope; in other words, it is not level with the ground but one end of it is titled higher than the other?

A. Yes, sir. And then it is rounded over.

[145] Q. In a sort of an arch?

A. Yes, sir.

Q. And the end up this way is the highest end of the crown-sheet?

A. Yes, sir.

Q. Now, you have just looked at that crown-sheet and I will ask you to state whether or not it does not show that some of the bolts up in the highest part of the crown-sheet have been cut out since the explosion or since the failure of the crown-sheet?

A. They have been drilled out, the indications are that they have been drilled out and the drill has cut part of the sheet.

Q. That indicates, doesn't it, that those bolts—

Q. What does that indicate?

A. May I finish that answer?

Q. Yes.

A. I do not see any signs, if that is the central part of the sheet, I do not see any signs of cutting right at the highest point, but that cutting has been down here and down here (indicating), but as the sheet stands there I cannot say whether it is the center sheet or just one side or the other. Now, that bulge may have been over here or over here (indicating), and if it has been cut out that way or this way (indicating), then these stays that were drilled out would be nearer the highest part of the sheet.

Q. All the bolts up in the forward end of the crown-sheet
[146] would be higher than any bolt in that same row further back on the crown-sheet?

A. Any bolt in that same row; yes, sir.

Q. I don't know whether you noticed when you were over there, if you did not I want you to look and see, if some of the bolts are not cut out in the forward end of the high part of the crown-sheet, whereas the bolts further back which would not have been subjected to heat in low water, have not been cut out?

A. That bolt (indicating) has apparently been drilled out, this one has been cut with a chisel and broken off, nicked as we call it, with a chisel. Now, here is one that has been drilled out and I see no signs of that one or that one or any of those back that way having been drilled out. There is one that is rubbed a little as if it might have been drilled out, but I cannot tell what did that.

Q. How about these down here on this row, this one?

A. That has been drilled out.

Q. Have any of these others in that same row been drilled?

A. No, sir; I do not see any signs of their being drilled.

Q. Now, I will ask you to look at the bottom part down there, the part next to the ground, and see if you do not find a similar condition as the bolts up in the crown-sheet, having been
[147] drilled out when the bolts in the same row further down the sheet were pulled out or broke off?

A. These two bolts there and the second and third of this first row appear to me like as if the heads had been cut with a chisel from the outside and the bolts taken out. Of course, one cannot say whether the chisel marks are made actually by some one or whether it was done chipping the bolts out.

Q. What does that indicate as to the bolts that were in those holes?

A. It indicates that the bolts must have been in there and taken out after the failure.

Q. Does it indicate or not, that the bolts which were first or longest subjected to heat held out longest, that is, if there had been low water?

A. No, sir; I couldn't say that, because those two are off on the side and therefore the sheet being curved in front like that, first subjected to the heat, is the top part.

Q. I am talking with respect to other bolts in that same row.

A. Oh, it does with bolts in that same row; yes, sir.

Q. It does indicate that the bolts which have been subjected first and longest to heat than any other bolt in that same row, have held out, whereas the other bolts which were not heated as quickly or as long, gave way, assuming that it should have occurred from low water?

A. Read the question.

(Question read to witness.)

A. I think that is true, but you should take into account that first row, those bolts are supported by a sheet, but then there are two or three bolts back of that that have been drilled out. That [148] one was drilled out and this one was drilled out (indicating), I could not tell whether the failure there was enough, but it does not look here as if the failure was enough to break that bolt.

Q. Does that condition indicate or not, that the accident or failure was caused by low water?

A. What condition?

Q. In reference to the holding out of those bolts in the high part of the crown-sheet?

A. It does not to me; no, sir.

Q. It does not indicate to you what?

A. That the failure was caused by low water. The second bolt there, if that had been hot, and if those behind it had been hot, should have pulled before they did (indicating).

Q. Does it indicate the contrary to your mind?

A. Yes.

Q. Now, if the button-head bolts had been properly screwed into the crown-sheet and properly fitted, and had pulled out when hot, would it or not in your opinion have left them in the sharp condition like they now are; that is, if the sheet had been hot when they pulled through or broke?

A. My opinion is that if the button-head bolts, as were testified were in that sheet, had failed because of being hot, sufficiently hot to cause a failure, they would not have pulled through the

[149] sheet, but the bolts would have broken off inside the sheet, on the water side, just inside where the greater strain is.

Q. What about the condition of the threads?

A. It would not have pulled out the threads at all. I should add to that, it would either have done that or pulled the head clear through, it depends on whether the bolts were weaker than the sheet or the sheet weaker than the bolts.

Q. The bolts which are fastened into this crown-sheet go up into what?

A. They go into the wagon top sheet as it is sometimes called.

Q. Suppose there is a change of relationship or a shifting between those sheets, what effect does that have on the bolt heads?

[150] (Manuscript page 150 marked out.)

[152] A. Read the question over again, please.

(Question read to witness.)

A. I cannot answer it, because my entire opinion is based on that very careful study of the whole subject and those experiments checking observation.

A. My answer to that question would be entirely based, almost entirely ,on that series of experiments and observation. It was a matter that was put up to me by the railroad company and

[152] I was working on it two or three years. I have got no other information but that, that amounts to anything; 90 per cent of my opinion is based on these observations and experiments.

Q. I want you to eliminate from your answer the detailing of any experiments which you have made, just give conclusions which you have applicable to this crown-sheet, and if you think you are qualified to state to the jury the effect of the change of the angle between those sheets upon this crown-sheet in question, the effect upon those bolt heads of the change in the angle between the

[153] sheets in this boiler, then you can answer it, otherwise you can not.

Defendant objected. Overruled. Exception.

By the Court:

If you can answer that question from your own learning on the subject, you can answer it.

By Mr. Staples:

As well as from his experiments?

By the Court:

I said from his learning on the particular subject, you can answer it.

A. Including everything?

By the Court:

What does learning mean, from your learning on the subject?

Defendant excepts.

A. I think it would have a slight effect on those bolt heads.

Q. State whether or not the change of the relative positions of those two sheets would probably weaken the bolts or bolt heads along the top of the whole crown-sheet?

A. It would tend to weaken it; I do not think the motion at the head in the crown-sheet on account of the length of the stays would be sufficient to injure the bolts very seriously unless the engine was running a long time.

By Mr. Hall:

Here are the stay-bolts that you asked for.

By Mr. Staples:

Are these all of the stays that you gentlemen have that came out of this boiler?

By Mr. Slayton:

These are all that are here, that we have; no, I think there are more in the box over there, and I will get them all.

(Stay-bolts are here produced.)

[154 Q. Is this bolt in such a condition now that you can tell anything about it at this time?

By the Court:

Speak out, Mr. Staples; I cannot hear anything you say.

A. No, sir; I cannot tell anything about it.

By the Court:

Is that one of the bolts that is admitted came out of the crown-sheet after the failure of the engine?

By Mr. Staples:

Yes, sir.

Q. Can you tell anything about this one (indicating)? Here

is a bolt that has been treated in some way, I do not know what has been done to it, it doesn't furnish us much light.

A. In answer to the other question, apparently this is one of those that were drilled out of the sheet; it looks as if it was, but it is so rusted I cannot tell much about it.

Q. These two bolts here are the only ones which the defendant has produced, as I am informed by them, which have not been experimented with or treated in some way since the failure of the crown-sheet. Are these two in such a condition that you can tell anything about them?

A. No, sir.

Q. Why can't you tell anything about these from their present condition?

A. Because what I would base it on would be the char-
[155] acter of the fracture at the end of the bolt, most of that in both of those cases apparently has been cut away and what is left is rusted so I cannot tell anything about it.

Q. Both look like they have been exposed to the weather since that time?

A. Yes, sir.

Q. If you had the bolts that came out of that boiler and they had been kept from exposure to weather conditions, could you take those bolts and examine them and tell whether they had been broken while hot or cold?

By the Court:

That question simply amounts to asking whether you can take a piece of iron and tell whether it was broken cold or hot. Answer the question.

A. I think I could; yes.

Q. Now, as to the button-head bolts, is there a liability to injury when they are screwed into the fire box where the holes are not tapped at right angles to the sheet and where the surface of the sheet is curved?

By Mr. Hall:

We object to the question, to the substance of the question and not to the form.

A. If your Honor please, I want to change that question a little bit. The tapping—there are two holes to be considered in order to make it clear to the jury, the tapping of one hole at right angles to the sheet, whether that hole is tapped at right angles to the

[156] sheet does not matter so very much, but tapping or having both holes punched so that when the stay is put in the heads will come out and bear evenly all around the sheet. Now, if it is not put in so, one side of the head may bear hard and the other side not at all, and then when you screw it up tightly it will tend to crack the head off.

Q. Is it, or not, in your opinion, necessary practice in building locomotives to use a seating tool which faces off the inside of the sheet exactly at right angles to the longitudinal axis of the bolts.

By Mr. Hall:

We object to the substance of the question.

A. I think it is advisable, though if care is taken in seating those holes I do not think it necessary; or if a washer is used under the head, it would not be necessary.

Q. Is it or not true that the average holding power of the usual form of stay-bolts at a dull red or almost a black heat could be decreased from its strength cold about 50 per cent?

A. Black or dull red?

Q. A dull red or almost black?

A. I should put that figure from my own observation,

[157] 60 per cent.

Q. Is it not true that at a bright red heat the holding power would be decreased to about one-fifth of its original strength?

A. Yes, sir; about that, one-fourth or one-fifth.

Q. Is it or not true that the sudden letting down of a few bolts throws such additional load on the adjacent ones that they are frequently unable to stand the strain and tear out row by row until the whole crown-sheet is blown down?

By Mr. Hall:

We object to the substance of the question but not to the form.

A. Changing that one word "frequently" and making it "may", would say yes.

By Mr. Hall:

We object to the answer in its amended form.

Q. What is the usual effect upon a crown-sheet where the bolts are in good condition and are subjected to sufficient strain to break them hot or cold, that is, as to the tendency to pull through?

A. The usual effect on the crown-sheet is to bag it down between some of the bolts and then when they give why the rest of it goes.

Q. As to the tendency to pull through the crown-sheet?

[158] A. Well, it depends on whether the crown-sheet is stronger than the bolt. Of course, if the bolts are larger than the thickness of the sheet, they will pull through; if smaller they will break off.

Q. I mean the effect on the crown-sheet itself where you have, say, three-eighths of an inch of crown-sheet and one and one-eighth of an inch of a button-head bolt?

A. They would pull away, a little way through, and might break and might pull all the way through.

Q. Is there or not a characteristic appearance left on the crown-sheet as the result of that?

A. Yes, sir.

Q. Do you find it present on this crown-sheet?

A. Yes, sir.

Q. Is it not frequently that engines can be seen in service with the crown-sheet bagged down in between the bolts?

A. Yes, sir.

Q. As is shown by that crown-sheet?

A. Smaller bags.

Q. If a crown-sheet should be heated while in service by low water and the water afterwards came over and covered the crown-sheet, would it or not, or might it or not, weaken the holding power of the bolts?

A. Read that question to me again.

[159] (Question read to witness.)

A. I do not think the water coming over it would weaken it so much as the heating.

Q. You say the heating would weaken the holding power of the bolt?

A. In other words, I think any weakening of the holding power of the bolt would be prior to the water having come on it.

Q. What are those little baggings in between the bolts and what do they indicate?

A. It indicates to me that it has been slightly warm.

Q. Previous to this time?

A. Previous to this time of total failure.

Q. What do you mean by slightly warm?

A. Probably a dark red, hardly hotter than that. I do not think the sheet looks as if it had been heated more than a dark red. It does not look like it has been heated more than that since it left the mill.

Q. Does it present the appearance of its quality or character having been changed very materially since it left the mill?

A. No, sir.

Q. Is it not true that a crown-sheet may be subjected to heat, that is to say, a dull red heat probably, and the water put back on it, and the meantime these pockets having been formed, and yet the crown-sheet not developed any leakage?

A. My opinion is that very frequently happens.

[160] Q. Is it or not true that the holding power of the threads of those bolts is sufficient to sustain the crown-sheet at ordinary pressure, in proper condition, not taking into consideration the holding power of the head of the bolt?

A. Yes, sir.

Q. You testified in this case before, didn't you, in the Federal Court at Roanoke?

A. Yes, sir.

Q. Had you opportunity at that time to give the case a very careful study or were you called up very suddenly?

A. Only two or three days.

Q. Have you studied it considerably since then?

A. I have gone through this matter afterwards. I dropped it entirely and did not think of it for a month or so and taken it up again so as to check my previous opinion to see if I was in error in any way.

CROSS-EXAMINATION.

By Mr. Hall:

Q. I believe you say that this crown-sheet which has been offered in evidence by the defendant shows that it has been burned, that is, overheated without water on top of it at some time in its history?

A. The small bags indicate that it has been, possibly about a dark red heat, possibly a bright red; but I think a dark red.

[161] Q. Professor Randolph, I am going to ask you very simple questions now and if you will just answer my questions we will get along faster. My question was simply this, as to whether or not the appearance of that crown-sheet now indicates that at some time in its history it has been overheated with water not on top of it?

A. I answered the question.

By Mr. Staples:

I think he answered your question.

Q. Do you say it was or was not?

A. Do I have to answer yes or no to that, your Honor?

By the Court:

No, you can answer your own way or to the best of your knowledge, information and belief.

A. I will answer it this way: it has been hotter than it was ever intended to be by the makers; will that suit you?

Q. Is it what is ordinarily called by engineers and boiler makers a burned crown-sheet?

A. No, I do not think so.

Q. What do they mean by saying that a crown-sheet has been overheated or burned?

A. A burned crown-sheet means that it has been so hot as to cause its failure.

Q. How do you describe a crown-sheet that has had water off a portion of it and been heated sufficient to show the effect of it, as you say is shown on this sheet, that does not fail?

A. Scorched.

Q. You—then you say that the bags between the stay-bolt holes of this sheet show it has been scorched?

A. At some previous time; yes, sir.

[162] Q. At some previous time?

A. Yes, sir.

Q. I wish you would state to the jury what area of that sheet shows that it has been scorched?

A. There is some part that has gone down, all of that, with some parts outside. There are indications of that through little distances outside from the bags there, that look as if they had been scorched.

Q. What I want is simply this: will you tell the jury how many feet long and how many feet wide the scorched area of that sheet is. If you don't know you can go over and look at it, measure is and come back and give us a simple answer of the length of the scorched area and the width of it.

(Witness examines plate.)

A. It looks to be about three and a quarter to three and a half feet wide and about four and a half feet long.

Q. Do you remember whether you measured the area of the scorched sheet when you testified in the case in Roanoke?

A. No, sir; I do not remember.

Q. You do not remember whether you did or not?

A. No, sir.

Q. So you give the area now as three and a quarter to three and a half feet wide?

A. Yes, sir.

Q. And four and a half feet long?

A. About four and a half feet long.

[163] Q. If that much of that crown-sheet was scorched as you call it, was it scorched with a fire under it and with no water on top of it?

A. May I amend that question?

Q. No; I prefer asking my own questions and I would like for you to answer it.

A. I cannot answer it.

Q. Say that you cannot answer it then.

A. I cannot answer it. Read me the question again, Mr. Morris.

(Question read to witness.)

A. There is only one way I can answer that; it may or it may not, which is the same thing.

Q. I will ask you this question: did that scorched area have water on top of it when it was scorched?

A. It may or it may not.

Q. Under what conditions may it have had water on top of it?

A. The scorching may have been due to mud or oil.

Q. Would it have had to have oil or mud on top of the whole area in order to scorch it that way?

A. At some time or another, part may have been scorched—it looks as if—my idea is from the looks of it that it was scorched without any water on top of it.

Q. You think it was scorched without any water on top of it?

A. Yes, sir; it may have been scorched either way; the appearances indicate that it is more likely to have been scorched without any water on top of it.

Q. Your opinion then is that that area was scorched with-

[164] out any water on top of it?

A. There is hardly information there enough to form a definite opinion just how it was scorched, whether from mud, oil, or low water; but it was scorched.

Q. Why do you say that it was scorched, what are your reasons for saying that area was scorched?

A. The little bags in between the bolts.

Q. How were those bags produced?

A. By the metal getting hot, and the only way in which it could get hot readily would be by water not being in contact with the sheet.

Q. It would have to have pressure on it to cause the bags, wouldn't it?

A. Yes—wait a minute—not necessarily, no. Not necessarily.

Q. You mean that you could heat it so hot that the iron would be in such a molten condition that it would bag down of its own weight without any pressure on it?

A. No, I do not mean that.

Q. What do you mean?

A. I mean that it gets red hot and the expansion of that sheet would make the sheet longer than it previously had been and that would be taken up by buckles between the bolts. Now, in order to make the question clear all around, the fact that nearly all these are down indicates that there was pressure on those, and if those
[165] buckles had occurred with no pressure on them, why some of them would probably have been up and others down.

Q. So then, if I understand you, you think that this bagging between the stay-bolt holes was caused by the sheet being hot under pressure?

A. Yes, under pressure.

Q. And without water on top of it?

A. It looked that way to me; yes, sir.

Q. To what extent are those spaces between the stay-bolt holes bagged?

A. Very slightly.

Q. You told us within a fraction of an inch the last time how they were bagged, can you do it this time?

A. From one-eighth to three-sixteenths of an inch, about, I should say.

Q. And you say that that bagging occurred before the crown-sheet blew down and failed, that is your opinion, is it?

A. Yes, sir.

Q. Was that bagging that existed at the time the crown-sheet blew down greater or less than it is now?

A. You mean the bagging between the bolts?

Q. Yes, sir; the bagging between the bolts.

A. Some places greater, apparently greater that is greater before; at other places it looks as if it was less than it is now.

Q. At what places was it greater?

A. Right in the center of the big bag there, it looks as if
[166] the previous bagging had stretched out a little bit.

Q. Isn't that true of the bagging of the entire area that is covered by the big bag that appears there?

A. I think some of them. It looks as if the bolts had failed and the pull that way (indicating) had caused the bag to become a little greater. In other words, the sheet holding there when it pulled down and pulled crooked on that bolt, it would push this part of the sheet up and this part down (indicating) and cause that bag to be a little greater than it had been before.

Q. My question was whether or not the bagging between the stay-bolts over the entire area that had been pushed down out of its normal position, wasn't stretched out and made less in being forced down in the position that it now is?

A. I think I have answered that question.

Q. Can you answer it again, please, sir?

A. In the central part there, the big part of the bag, the lowest part, it looks as if it had been stretched out and the bags made a little smaller. In the other part, as it were, the bolts evidently pulled at an angle before they broke, the bags appear to be a little larger than they would have been normally.

Q. Why do you say larger than they would have been normally?

A. Or larger than they were previously.

Q. Than they were previously?

[167] A. Yes, sir.

Q. How large were they previously?

A. Judging roughly there, from one-eighth to three-sixteenths.

Q. You said a few minutes ago that from one-eighth to three-sixteenths, now I want to ask you how much larger were they previously?

A. Did I say that?

Q. Let the stenographer turn back and see.

(Stenographer here reads witness' previous evidence on this subject.)

Q. I mean previous to the failure and before they were stretched out?

A. I said before that—previous to the failure they were about one-eighth or three-sixteenths.

Q. You said that before?

A. Yes, sir.

Q. Did you intend to say when I was asking you about the extent the sheet was bagged—

A. (Interposing.) Before the failure.

Q. That the bagging was before the failure one-eighth to three-sixteenths?

A. The bagging before the failure was about one-eighth or three-sixteenths.

Q. When you answered the question before and gave the extent of the bagging, did you give the extent of the bagging that now exists between the stay-bolt holes or the bagging that existed before the explosion occurred?

A. The bagging that existed before the failure.

[168] Q. That is what you gave before?

A. That is what I intended to give.

By Mr. Staples:

What do you mean by before, Mr. Hall?

By Mr. Hall:

I mean at the last trial. Professor Randolph understands what I am talking about.

By Mr. Staples:

I don't know whether he does or not.

A. Yes; I understand.

Q. I now want to hand you some bolt heads and ask you this question: if those bolt heads came off of the part of the crown-sheet that failed and were broken off by the faillure, was the shape of the crown-sheet around those bolts in the same shape that the heads of the bolts are next to the crown-sheet?

A. Did you use the present or past tense, was or is?

Q. I asked you was.

A. At the time of the failure?

Q. Yes.

A. Yes; I should say so.

Q. The crown-sheet around the bolt holes follows the contour of the upper surface of those bolt heads?

A. Yes, sir.

Q. And the bagging of that crown-sheet was sufficient between those stay-bolt holes to have put the stay-bolt holes in that shape, wasn't it?

A Prior to the failure?

[169] Q. Yes.

A. No; I do not think so.

Q. Why not?

A. Take this one for instance. That has been put in that shape by the sheet pulling down here on this side (indicating); that sheet has gone down this way, because if you look across there you will see, gentlemen of the jury, that those two surfaces are nearly on the same level and come out nearly straight If you look across that way you see that surface runs down that way (indicating).

Q. When the sheet had forced it down that way, pulling one side harder than the other, was the bolt head hot or cold?

A. I should not say this was hot, it is apparently hot enough to change the color condition of that broken surface, but I cannot say.

Q. Didn't you say to the jury that one side of that bolt head was forced down so much further than the other that it indicated that it was pulled down there at the time the failure occurred?

A. Yes; at the time of the failure.

Q. In other words, if I understand you, this side of this bolt head was forced down so much lower than the other side?

A. No; this side (indicating), those edges there.

Q. More than the side of it in another position and—

A. (Interposing.) In other words—

Q. (Interposing.) Wait until I finish the question. I
[170] understood you and I want to get it down. It is forced down so much lower on one side than it is at another place on the bolt head that you think that it was forced down lower on this side by being pulled down that way in the explosion (indicating).

A. At the time of the failure; yes, sir.

Q. Now, my question is, and I will repeat it, whether or not this bolt head when it was forced in that shape that you have described, lower on one side than on the other side, was it hot or cold? In other words, did it have water on top of the crown-sheet or did it not?

A. The looks of the bolt would indicate that it was not hot. If you will define heat there as red heat or something above?

Q. I don't care about defining heat at all.

A. I must define it to use my terms.

Q. All I want is for you to say to this jury, Professor Randolph, whether the top part of the crown-sheet had water on it at the time that head was forced in that shape, in the shape you have described it was forced in, at the time of the failure, or whether it did not have water on it; that is all I want you to say.

A. Read the question, please.

(Question read to witness.)

A. It may have had water on it a short while before and the

water gone off.

Q. How long before?

A. Just a fraction of a second, possibly.

[171] Q. So then, by removing the water from the top of the crown-sheet for a fraction of a second the head of that bolt would become so heated—

A. (Interposing.) No—

Q. (Interposing.) Wait a minute and let me ask the question and then you can answer it. Would become so heated beyond the temperature that it has when the crown-sheet had water on it, that it would be forced in that shape by the crown-sheet?

A. No. Read the question over again and see if I can get it straight.

(Question is here read to the witness.)

A. The point is this, Mr. Hall, that may have been off on one side, we do not know what part of the sheet that came from, and the water gone down and it may have put out the fire, so there wouldn't be anything to heat it, so there would not be anything to heat it, so it was not hot, in the definition I gave of heat a little while ago, that it was not white hot.

Q. All right. I will ask you this question: Will you tell the jury whether or not a bolt head of that kind under a crown-sheet can be sufficiently heated with water on top of the crown-sheet to cause it to change the shape and to be put in the shape that bolt is by the crown-sheet being pressed against it by an explosion?

A. It might have been put in that shape cold.

Q. By the crown-sheet?

A. The motion of the crown-sheet; yes, sir.

[172] Q. You say it could be put in that shape cold?

A. Yes, sir.

Q. What pressure would it take to put the head of the bolt in that shape when it is cold?

A. The pressure in the boiler or the pressure on the bolt?

Q. The pressure in the boiler, what pressure in the boiler would create enough strain on the bolt?

A. It depends on how much previous area around that bolt had been weakened when the bolt failed.

Q. As I understand you, that cold crown-sheet or one that has water on top of it, can be forced in such a shape as to put the bolt head in that shape cold?

A. Yes.

Q. What sort of pressure in the boiler would it take to force

the crown-sheet, which is three-eighths of an inch thick, into that shape?

A. To force the crown-sheet in that shape, you mean to have the crown-sheet force the bolt in that shape?

Q. Yes, sir.

A. That is what you mean?

Q. Yes.

A. Oh, 185 pounds would do it, if enough of the other stays around there were broken, to put pressure on.

Q. With water on top of it?

A. Yes, sir; water on top of it.

Q. How many other stays around would it be necessary to be broken?

A. I would have to give—I suppose for your purpose at [173] least ten or fifteen.

Q. This is the bolt that you have just examined, and that you say is forced down more on one side than the other; it is marked No. 12, as indicated by these dots on it, isn't it?

A. 12 dots; yes, sir.

Q. Now, I show you one that has six dots on it, and I will ask you whether or not that indicates that it is forced down more on one side than it is on the other?

By Mr. Staples:

I want to interrupt you one second. Have any of these bolts been experimented with?

By Mr. Hall:

No, sir; they are just as they were picked up in the fire box.

By Mr. Staples:

I noticed that some of them had a reddish appearance and some a blueish appearance, and I thought perhaps that some of them had been experimented with.

By Mr. Hall:

No, sir.

A. Please read the question.

(Question is here read to the witness.)

A. Yes, sir.

Q. Was that bolt head put in that shape prior to the failure or at the time of the failure?

A. I think it must have been at the time of the failure.

Q. You mean that it was forced down on one side at the time of the failure?

A. Unless there was a partial failure prior to this one.

[174] Q. If there had been a partial failure prior to this one, what would have occurred?

A. The engine might have run on.

Q. What do you mean by a partial failure then?

A. If one, two, or three bolts had gone.

Q. The heads dropped off?

A. Yes, sir; or the bolts broken.

Q. Which do you mean, the heads dropped off or the bolts broken?

A. Either one.

Q. I will ask you to look at this one, it seems to be No. 10, and I will ask you to state whether or not that bolt head took that position when it was heated or when it was cold, or as cold as it would be with the crown-sheet with water on top of it?

A. In order that the jury can understand that, I would like to hand this to them.

Q. Very well, do so.

A. You notice that is very dark down in there and light blue here (indicating), that looks like fresh iron in here. Now, unquestionably, that fresh iron looks like the last of that fracture was when it was cold, it looks as if it had dropped down possibly for a moment or had gotten in some place to make that light blueish streak in the center, the other part looks as if it had been hot some time

[175] and turned a dark blue. You will also have to take into account that it has been standing for some time and there is a little rust there that obscures the fracture.

Q. So you say this fracture took place when it was cold?

A. This last part; yes, sir.

Q. You mean this part up here (indicating)?

A. This projecting part that is bent over.

Q. And when did the other part of it take place; was it hot or cold?

A. It looked as if it was hot.

Q. Now, here are two that have no projections at all; I wish you would look at them and state whether the failure took place there when they were hot or cold?

A. I should say that part of that failure took place when hot and part cold.

Q. Now, you mean by hot in that connection that there was fire under the sheet and no water on top of it, don't you?

A. No; I do not.

Q. What do you mean by it?

A. I mean that that bolt was about—it looks there as if there had been a dull red heat.

Q. Does a bolt get to a dull red heat under a crown-sheet when there is water on top of it?

A. It may.

Q. And the water still be on top of it?

A. On top of the crown-sheet; yes, sir.

[176] Q. How would it get in that condition, Professor?

A. By vivid combustion.

Q. What do you mean by that, what kind of a combustion do you mean?

A. A good hot fire.

Q. Do you mean to say that with the ordinary fire—

A. (Interposing.) Ordinary fire.

Q. (Continuing.) That is made in a locomotive fire box?

A. Yes, sir.

Q. That you can heat the head of those bolts to a dark red heat when there is plenty of water on top of the crown-sheet?

A. Yes, sir; and I will say that this part here has frequently been, that much of it (indicating), a dark red heat.

Q. How hot does the crown-sheet get, does it get a dark red heat too, with water on top of it?

A. I don't think it ever does, of course, free from mud and oil, you understand.

Q. Now, do I understand you to tell the jury that if these bolt heads originally had a square shoulder on top of them and were in that shape when they were placed in the crown-sheet that they could have been forced in the shape that they are in now with water covering the top of the crown-sheet?

A. What do you mean by a square shoulder; I don't see

[177] anything about a square shoulder here. I didn't say anything about a square shoulder. Read the question.

(Question is here read to the witness.)

Q. But I did; I said that. What I mean by a square shoulder is, when the shoulder of this bolt runs in there at right angles to the bolt?

A. And fixed securely?

Q. Yes; that is what I mean.

A. Now, your question is, could that have been put in this shape with water on top of the crown-sheet?

Q. Yes.

A. Yes, sir.

Q. How?

A. By other bolts near it failing and the sheet pulling down cold.

Q. So if all the other bolts around one bolt had failed and it went down cold, then the one bolt that held would have been forced in that shape?

A. No.

Q. Then that held longest—

A. Pardon me, you have got your question wrong. You say if all the other bolts around that one bolt. If a lot of bolts on one side of that bolt had failed it would probably have been put in that shape because the condition there means that this side has probably held and the sheet had gone down this way (indicating).

[178] Q. I believe you said awhile ago that this general convex shape in these bolts that are regular was made by the crown-sheet bagging down and forcing them in that shape, didn't you?

A. We had that up before and the question came up whether that bagging was done previously or at the time of the failure, and then you threw out that question; you are bringing that question back again.

Q. No; I didn't make any distinction about that. I don't care whether it was previous to the failure or not. What I asked you awhile ago was, and I think you added in your answer, that it was put in that shape previously to the failure; but what I asked you was whether or not when this bolt head on the top side of it was given a convex appearance that it now presents, if the crown-sheet around the bolt followed the contour of the bolt, and you said it did, didn't you?

A. Yes; I see your question now—at the time of failure, that is, just before they separated.

Q. I am not asking you about the time of the failure. I ask you this question and all I want you to do is to answer it, whether or not when the top side of that bolt was given that shape, if the crown-sheet around the bolt followed the contour of the bolt head?

A. Affected this (indicating)?

Q. Yes, sir.

A. At the time this was given that shape?

Q. Yes, sir.

A. Yes, sir.

Q. And you say further than that, that if it had a square
[170] shoulder it was given that shape by the crown-sheet's bagging and forcing it down in that shape, didn't you?

A. By the crown-sheet forcing it in that shape?

Q. Yes.

A. Yes; by the crown-sheet forcing it in that shape.

Q. Now, did that bagging of the crown-sheet between the stay-bolt holes, to put the bolt heads in that shape, occur when the crown-sheet had water on top of it or not?

A. We went over that before, that is a question—it may or may not; but if the water was not on top of it, the water must have been out enough to put out the fire so as not to let it get hot, and that change in form there, I think was done when it was cool or not hot.

Q. I wish you would look at that one and see if that has not got the same concave appearance that the other had?

A. No, sir.

Q. Has it got any concave appearance at all?

A. Slightly.

Q. Was the crown-sheet bagged around that bolt when it was forced in that shape?

A. This one looks as if it might have been caused by—the crown-sheet might have been bagged around this and caused this.

Q. Bagged around and caused it?

A. Yes, sir.

Q. Now, Professor Randolph, I show you a number of crown-sheet bolt heads, marked with dots from one to twelve, and they are the ones that were picked up in the fire box of this engine after the explosion occurred in which Mr. Andrews was killed. Now,
[180] I wish you would look at the heads of them and say whether or not they indicate that there was any bagging of the crown-sheet around the heads of them or not?

By Mr. Staples:

I think the question is objectionable because counsel practically testifies as to the fact that they are the bolts which were picked up out of the fire box. As a matter of fact, the testimony of the witnesses for the defendant whose deposition was taken, stated that he saw no bolt head in that shape at all. We do not admit that they came out of this particular engine, still I have no doubt they will have witnesses

to prove that, yet I do not think counsel ought to state something as a fact that is not admitted. We do not know whether they were or not.

[181] Plaintiff excepts.

A. Now, what is the question?

(Question is read to the witness.)

A. There are one or two that indicate that it might have been caused by bagging but the others indicate that the form was caused almost entirely at the time of failure.

At this point court takes a recess until 2 o'clock p. m.

[182] OCTOBER 7, 1914, 2 p. m.—AFTERNOON SESSION.

L. S. Randolph still on the stand.

Continuation of cross-examination by Mr. Hall:

Q. Professor Randolph, just before we went to dinner I showed you these bolts and I asked you whether the shape that was given to the top part of the bolt, that is the part that fits up against the crown-sheet, was given to them when they were hot or when they were cold, that is, when the crown-sheet had water on top of it or when it did not have water on top of it, and what was your answer?

A. May the stenographer read my answer also?

(The answer of the witness is here read.)

A. That was the answer to the question.

Q. That was the answer to the previous question. Now, what do you say about those bolts having taken that shape when the crown-sheet had water on top of it?

A. The substance I think was asked. The answer is, some of those bolts seem to have been put in that shape at the time of the failure. Now, my opinion is that when the failure started there was water on that crown-sheet; in other words, that the sheet was

[183] not hot; some of them out near the end; there might have been water and it might have been blown through previous to the failure of the bolts and put out the fire, and when they came to a distortion of those there was no water on the crown-sheet.

Q. You mean after they had broken off and fallen down?

A. No, I do not. I mean when they broke off, they were put in that shape when they were broken off.

Q. Would the water get off the crown-sheet before these bolts let loose?

A. It might.

Q. How?

A. By the previous bolts failing and those being the last ones to fail, they look like that.

Q. Did that crown-sheet come down gradually or did it come down all at once?

A. I should say—it looks like a portion of it failed first and the rest ripped out, the bolts indicate that.

Q. How long was it between the time the first part failed and the time the whole thing went down?

A. It might have been three or four days; it may have been as many seconds; I cannot tell.

Q. Suppose a portion of it failed before, would it have been detected when the engine was put in operation?

A. Detected when the engine was put in operation?

Q. Yes.

[184] A. It might or might not; it might have stayed down and not have been noticed at all.

Q. When that bagging took place that you referred to when the sheet was scorched before the failure, did that have any effect on changing the form of the upper part of the head of the bolt?

A. What do you mean by the upper part, the round part that fits against the sheet?

Q. Yes.

A. There are one or two that indicate they might have been put in that shape by bagging at that time.

Q. Which one or two are those? Pick them out and show them to us.

A. Those two (indicating). The jury will notice they seem to be pulled down there uniformly all around.

By the Court:

See if they are not numbered with little dots on them and give the numbers.

Witness:

This is No. 8 and No. 6.

Q. So those two indicate—

A. (Interposing.) That they might have been caused at the time of previous bagging.

Q. Might have been caused by previous bagging?

A. Not necessarily, but might have been.

Q. Would that previous bagging which you say amounted to

three-sixteenths of an inch, from one-eighth to three-sixteenths of an inch, have changed the shape of the head of those bolts?

A. It might have changed those.

[185] Q. Would it have changed the heads in the bolts that were between the points that are bagged?

A. It probably would; yes. All might have been a little pulled down a little, but probably it would have been uniform all around.

Q. Would the effect of that bagging of the crown-sheet which you say occurred prior to the accident—what effect would that have upon the threads of the stay-bolts and the threads of the crown-sheet?

A. It would tend to elongate the head, that is, elongate the holes, making the holes larger, stretch the holes, and the threads would not fit as well.

Q. Not fit as well?

A. No, sir; not fit as well.

Q. I wish you would state whether or not the threads in that crown-sheet appear to have been ripped out when the crown-sheet went down?

A. Some of them do and some of them do not.

Q. How about the lowest part of the crown-sheet, the part that went down most?

A. There is one over there that looks like I think it has been stripped.

Q. Only one?

A. I notice only one.

Q. Isn't it a fact that nearly all the threads in that bulged area of the crown-sheet are not stripped?

[186] A. Without making a critical examination, I should say that nearly 80 per cent or 90 per cent of them show very little if any signs of stripping.

Q. If this crown-sheet failed from these bolt heads breaking off as those appear to have been broken off, why did not the stay-bolt threads hold the crown-sheet in place?

A. That is on the assumption it failed from the failure of those bolts. Well, some of those are broken into the thread. Read that question over again, please.

(Question is here read to the witness.)

A. It would indicate that there had been a failure of others, of stay-bolts elsewhere, and these were pulled out.

Q. Pulled out how?

A. By too great a strain. For instance, there is one that I feel sure was pulled and broken at the time of the failure, and pulled

right out. You see how this sheet is bent over to one side there (indicating on exhibit No. 10).

Q. Why didn't it strip the threads then?

A. In the stripping of a thread, the thread of the bolts generally stretch or the outside of the thread, what we call the female thread, will not stretch. I have seen plenty of bolts with the threads entirely gone on the bolts, and the nut good, little or no sign of stripping on the nut or female thread.

Q. The threads are not stripped on those two that have a portion of the bolts on them, are they?

A. I did not notice them.

[187] Q. Well, are they?

A. There are signs of stripping on this one (indicating No. 9 dots) and some on this one.

Q. They are so slight that you have to examine them with a magnifying glass to see those signs of stripping, are they not?

A. Yes, sir.

Q. Now, I repeat my question and ask you why, if the threads are stripped off the bolts first and generally stripped off, why they were not stripped off these two in order for these heads to break off and come out?

A. Because the head supported the nut and took the stress off the thread there. You see that was pulled out this way (indicating), and this part was bearing on the sheet, so that the strain did not come entirely on the thread that was pulled out this way.

Q. When the bolt heads were buckled, I mean made to change their shape by the buckling of the crown-sheet, what effect did that have on the diameter of the holes into which they were screwed in the crown-sheet?

A. You mean the bending of the crown-sheet, not the buckling?

Q. Yes, I mean those pockets that were formed that you have been talking about between the stay-bolts.

A. Read that question again, please.

(Question is here read to witness.)

A. It would be bound to enlarge them.

Q. Would that cause a leakage?

[188] A. Yes.

Q. Have you had any experience in inspecting crown-sheets?

A. Yes, sir.

Q. Could you have discovered by an inspection that buckling or bagging of the crown-sheet between the stay-bolt holes which oc-

curred previous to the burning?

A. I have discovered it on other boilers and I think I could on this.

Q. There wouldn't be any trouble about discovering that, would there?

A. No, sir.

Q. Any man that knew anything about inspecting the crown-sheet of a boiler, if he had looked in there and found this buckling between the bolt holes, he could have found it without any trouble?

A. Yes, sir.

Q. Now, I wish you would tell the jury whether that crown-sheet was forced down or buckled enough to have caused it to have leaked by the scorching?

A. By the scorching?

Q. Yes.

A. I cannot tell; I think it probable that some of the bolts did leak, and it may or may not; it may have leaked at the time it was scorched and taken up afterwards, taken up immediately afterwards.

Q. Did you ever see a crown-sheet scorched to the extent [189] that that one was that did not leak?

A. Yes, sir.

Q. What had been done to it to keep it from leaking?

A. Nothing.

Q. Why didn't it leak?

A. The water going into it carried some scale and evaporated and left the scale behind in the threads and closed them up.

Q. How long did it take to do that?

A. I don't know, the best evidence I could give was in one case the indications were that it had been scorched two or three weeks before I found it. I know that no leaking was ever reported on that engine.

Q. Do you know that it was not corked up?

A. It might have been corked out on the road; yes. I do not know.

Q. You don't know whether it leaked or not; all you know is that no leakage was reported?

A. It wasn't reported; it may have leaked.

Q. I did not ask you what had been reported. I asked you if you ever saw a crown-sheet scorched to the extent that that one was, over an area of 3¼ to 3½ feet one way and 4½ feet the other way, that did not leak?

A. I never saw a crown-sheet scorched at the time of scorching; I always saw it afterwards, and some time afterwards. That answers your question.

Q. And you never saw but these two that you have mentioned which you saw some time afterwards, that did not leak?

[190] A. Oh, I have seen quite a number that have been scorched and did not leak when I saw them; but I did not know the history of those. I simply remembered two cases in which—I expect three cases—where the evidence showed on examination that they had been scorched two or three weeks ahead.

Q. You don't know but what the bolts had been taken out in those cases and new bolts put in?

A. It could not have been done on the road without my finding it out.

Q. You don't know whether they were corked up out on the road or not?

A. No; I do not.

Q. Professor Randolph, how many crown-sheets did you ever know to blow down that had water on top of it, at the time that they were blown down?

A. I never followed up one; I never had a case of blowing down of the crown-sheet under my own jurisdiction. I have had cases of a bad failure of a boiler under my own jurisdiction, but what I have seen is examination of boilers on other roads, failures on other roads, and from what I could hear of them and get the information in that way.

Q. So that in your whole experience you have never known a crown-sheet to blow down when it had water on top of it?

[191] A. Well, no; that is, I want to get that answer correctly. I never knew the conditions sufficiently.

Q. That is what I mean. You are not able to come here and tell this jury that you ever knew of a single case where a crown-sheet blew down with water on top of it?

A. Or I knew the situation sufficiently to say that crown-sheet blew down under those conditions.

Q. Now, you say that a crown-sheet scorched over an area that this one was, and with a crown-sheet between the stay-bolt holes bent down to the extent that this one was might or might not leak?

A. Yes, sir.

Q. If it did not leak it would be due to the fact that the spaces caused by the stretching of the crown-sheet, the opening of the holes,

had been filled up with something, that is correct, isn't it?

A. I think yes; in general cases. It is possible that it did not leak right at the start, but it is more than probable that the proper answer to your question is yes.

Q. I wish you would look at the front end of that drum there that is in front of you and tell the jury whether or not in your opinion that has been burned; that is, heated with no water on top of it.

[192] (Manuscript page 192 marked out.)

Plaintiff excepts.

A. Yes, sir; that has been hot.

[193] Q. How hot?

A. That center looks as if it has been a bright red; the sides a dark or dull red. I notice that the scale will scrape off, I can scrape a little piece off with my knife, as you see.

Q. Has it been pocketed in between those stay-bolt holes?

A. I do not see any signs of it

Q. You do not see any signs of it?

A. No, sir.

Q. The pocketing certainly is not as great as it is on that crown-sheet?

A. No, sir.

Q. Now, as I understand your testimony, it does not injure a crown-sheet to heat it hot without any pressure on it, does it?

A. It depends on how hot, and whether a cherry or a bright red or a dull red; I do not think it injures it.

Q. As hot as that one has been heated?

A. I should not say that one has been injured very seriously.

Q. What causes a crown-sheet to leak from being scorched or burned?

[194] A. Usually the fit between the threads of the stay-bolts and the sheet is changed.

[195] (Manuscript page 195 marked out.)

Q. Now, I understand you to say, Professor Randolph, that the reason why you think that crown-sheet was burned previous to the accident is on account of the absence of the line of demar-

[196] cation or colorings that would exist if it had been burned at

the time it blew down, is that correct?

A. No, sir.

Q. Why do you say that that crown-sheet had water on it at the time it went down?

A. Because if it had not had water on it at the time of the failure it would have been very hot and there would have been a different color and condition of the surface of the sheet.

By the Court:

On which side?

Witness:

The fire side.

[197] Q. So then your reason for thinking that it did have water on it is that if it had gone down without water on it it would have a different color and a different kind of scale on the sheet?

A. If it had gone down without water it would have been a bright red or a white heat, which would have given a different color and condition of the surface on the fire side of the sheet.

Q. Is that your only reason for saying it went down with water on it?

A. That is the principal reason.

Q. You say it is the principal reason; didn't you say at the last trial of this case that was the only reason?

A. I do not remember what I said at the last trial. As I said before, I put that trial behind me and checked up the whole thing again and have gone all over it.

Q. All right. Now, I ask you again, if your only reason for saying that sheet went down with water on it is what you have stated?

[198] A. I said it is my principal reason and it is pretty nearly the only reason. There are other little things of minor details.

Q. In the absence of that principal reason and what you call practically your only reason, you wouldn't be able to say that that sheet went down with water on it?

A. Read the question.

(Question is here read to witness.)

A. If I could not see the sheet I could not tell anything about it.

Q. You think that answers my question?

A. I think that answers your question.

Q. You think there is nothing else about that sheet, about the coloring, that would enable you to say that sheet went down with

water on it?

A. Yes.

Q. What?

A. The form of the failures around the sides and corners there indicates that this bolt (indicating) pulled down, the sheet dropped down under pressure and then pulled this bolt down; in other words, it was a successive failure, bolt after bolt. These bolts pulling out like that indicates that, or this bolt (indicating No. 10), and there is another one here (indicating No. 9)—that bolt indicates that was pulled off this way (indicating).

Q. Would the coloring or the line of demarcation—

A. (Interposing.) What do you mean by line of demarcation?

Q. Between the scorched area and the area that was not [199] scorched, the appearance on the top side of that sheet.

A. You mean the water side?

Q. Yes.

A. There seems to be a little of the boiler scale, the lime scale, showing on the part that was not scorched; the failure of the sheet has broken off the rest of it, and leaves a reddish color.

Q. Professor Randolph, did I understand you to say that you could not tell how long this previous scorching had taken place prior to the failure?

A. I cannot tell.

Q. It might have been scorched three or four days before and it might have been three months before, you said; didn't you?

A. I said three or four hours, I think.

Q. How could you tell it was three or four hours before?

A. I was just thinking of that subject, studying that subject, to see whether that three or four hours should be—can you give me my reply to that question?

Q. It is going to take a long time to look for it.

A. If it had been two or three minutes it would have been a different proposition and there could have been more signs of rupture of the sheet than there are in this case.

Q. Suppose it had been a half an hour before?

A. If it had been half an hour before and the water had come back on the sheet to cool it, the conditions would be just about as we find them.

Q. So then, you cannot tell the jury whether it was a [200] day or an hour before or some time before?

A. The only way I could tell—the only thing that would give any evidence as to the time, is the length of time it would take

to get the water back on the sheet and cool it.

Q. Then any space of time that will enable you to get the water back on the sheet and cool it, would be sufficient time to elapse between the prior scorching and the failure?

A. Yes, sir.

Q. So the prior scorching might have occurred fifteen minutes before the failure?

A. That brings up the question of the length of time, and I do not think the water could be gotten back on that and cool it, had it been uncovered, that amount, in fifteen minutes.

Q. But you do think it could have been gotten back on there in sufficient quantity to cool it off, had it been scorched half an hour before?

A. Certainly three quarters.

Q. Didn't you say half an hour awhile ago?

A. One-half to three-quarters.

Q. You put it that way now, one-half to three-quarters?

A. About that time. You see the difficulty is how long would it take to get that water back, and without a calculation I cannot state.

[201] Q. You say if it had been three minutes before there would have been more signs of a rupture on the sheet?

A. Yes, sir.

Q. What signs would there have been?

A. It would have been torn out at the bolt holes; that is, there would have been cracks out from the bolt holes.

Q. The sheet would have been torn?

A. Yes, sir.

Q. How many crown-sheets have you ever seen that were blown down from absence of water on them?

A. I wouldn't like to say.

Q. I mean that were actually blown down; I am not asking you how many you have seen scorched.

A. I know; you mean where a sheet was hot and where it failed on account of that?

Q. Yes.

A. I do not remember; I should say twenty or thirty at least.

Q. When was the last time that you saw one that failed because it did not have any water on top of it?

A. The last one, I did not examine very closely; but it was about two or three months ago. I could just see the sheet from the railroad train as I passed.

Q. Where was that?

A. East of Montgomery tunnel.

Q. And you were passing by on the train?

A. Yes, sir.

Q. Could you tell how much it was burned?

[202] A. It was twisted; and I saw one a couple of years ago.

Q. That had been blown down from low water?

A. Unquestionable, it was twisted.

Q. Where did you see that?

A. My recollection of that one, it was at Richmond.

Q. When did you see one before that?

A. The one before that I do not remember. The one before that was about fifteen or twenty years ago on the Baltimore & Ohio.

Q. How did you happen to see this one in Richmond?

A. I was passing along through the American Locomotive Works and they showed it to me.

Q. You made no particular examination of it, did you?

A. The sheet told me the story.

Q. How long have you been teaching at Blacksburg?

A. Twenty-one years.

Q. What have you had to do with locomotive boilers and crown-sheets of locomotives during that twenty-one years?

A. I have to study that subject and teach it, and in order to keep up on that I have had to keep more or less in close touch with the construction at our shops.

Q. Of locomotive boilers?

A. Locomotive boilers.

Q. At what shops?

A. The different shops I have been in.

Q. How often do you go to those shops?

[203] A. Possibly every year or two.

Q. And what shops do you usually go to?

A. Sometimes the American Locomotive Company's, sometimes the shops in Baltimore of the Baltimore & Ohio, and sometimes the Norfolk & Western shops.

Q. You said that the proper practice was to seat these button-head stays in the crown-sheet with a seating tool, or that was advisable, didn't you?

A. I do not think I said that. That it was very good practice especially, but if care was taken to put the bolts in properly so that they would make it seat properly, I did not think it was necessary always.

Q. So the only thing that you have seen of practical construction of locomotive boilers in the last twenty years is that you visited around at the various locomotive and railway companies' shops?

A. Yes, sir.

Q. And examined them in that way?

A. Yes, sir.

Q. You testified in this case at Roanoke, I believe, didn't you?

A. Yes, sir.

Q. How many days were you down there?

A. Four, I think.

Q. You came down there from Blacksburg to testify as an expert witness?

A. Yes, sir.

Q. You had not seen the crown-sheet or the bolts or any-
[204] thing about it when you came down there?

A. Not until after I got there.

Q. What arrangement was made with you about coming down there to testify?

A. I got, I think, a telephone message from Mr. Staples, asking me to come down.

Q. What compensation did you get?

A. My expenses.

Q. What was your arrangement as to the compensation you were to get for attending that trial?

A. No arrangement whatever.

Q. Do you mean to say that you left your classes at Blacksburg for a period of four days and went down to Roanoke without any arrangement being made for compensation for your testimony?

A. Yes, sir.

Q. You did?

A. Yes, sir.

Q. And what arrangement for compensation has been made with you to testify here?

A. None at all.

Q. Do you always go as an expert witness on those terms?

A. I think most of the cases—no, sometimes—I do not think that question—I do not remember a single case where that has ever come up before the trial that I had any arrangement whatever; I cannot remember a case now.

Q. But you knew nothing at all about this crown-sheet
[205] when you went down there to Roanoke to become an expert witness in the case?

A. I knew nothing at all about it; I had never seen it.

Q. Did I understand you to say that these bolt heads indicate that they were burned to a bright or a dark red heat, or heated to a dark red heat?

A. That dark color in there, and in this side of that one and in some others, indicates that that fracture has been hot, that portion has been hot since the fracture or at the time of the fracture.

Q. So you would say that at the time of the fracture or since the fracture that bolt head has been heated to a dark red heat?

A. At the time of the fracture or since the fracture, that has been heated to at least a dark red heat.

Q. This is another one that you referred to?

A. Yes, all of those give this dark blue color; this one looks as if it was hot, it looks as if a portion of it remained hot and was broken afterwards; that I think is another one that has been hot since the fracture.

Q. Since the fracture?

A. Yes, sir.

Q. So all three of these you would say indicate that they have been hot since the fracture?

A. Yes.

Q. And that they were not broken hot?

[206] A. They might have been broken hot; yes. They might have been hot when they were broken.

Q. To what degree of heat were they heated if they were hot when they were broken?

A. That does not look as if it had been over a dark red blue.

(The bolts referred to in the foregoing questions are numbered 2, 3, with dots, and one with the figure 9 on it.)

By the Court

Was that one of the bolts that was identified here, one of the twelve?

By Mr. Hall:

No, sir.

By the Court:

This wasn't found in the fire box?

By Mr. Hall:

No, sir.

A. I will add to that, this No. 9 looks as if it had been hardly

up to a dark red.

Q. So the one with the number 9 on it doesn't look like it was heated as hot as 2 or 3?

A. No.

Q. It doesn't look as if it was as hot or heated as hot as Nos. 2 and 3?

A. No, sir.

RE-EXAMINATION.

By Mr. Staples:

Q. If the heads of the bolts were cracked off and fell down in the fire, would that heat the bolts up?

A. Yes, sir.

Q. Mr. Hall asked you about the size of the scorched area,
[207] Is all of the crown-sheet produced there?

A. No, sir; I do not think so.

Q. You do not know whether the part of the crown-sheet that they did not bring in here was scorched or not, do you?

A. No, sir.

Q. That may have had bags on it too, may it not?

A. It may have, yes.

Q. These are what you would ordinarily term as bolt heads that were mutilated, all of these bolt heads are more or less mutilated?

A. Yes, sir.

Q. How hot do you think a crown-sheet supported by the number and kind of bolts that crown-sheet is supported by, would have to be to go down from low water if all the bolts were in perfectly sound condition?

A. I think at least white hot.

Q. If it had been heated to that degree of heat, tell the jury whether or not the contortion and twisting of the bags wouldn't be different from what it is?

A. All that I have ever seen that have gone down were twisted badly and wavy and generally torn or ruptured.

Q. If the sheet followed tightly the contour of the depression on the bolt heads, and the threads of the sheet continued to fit tightly around the threads of the bolt, would that result in a leak around that bolt head necessarily?

A. If the threads on the under side of the head fitted
[208] tightly, would it result in a leak, is that your question?

Q. Yes.

A. No, not if they fitted tightly.

Q. You said you have not seen any crown-sheet that you have been familiar enough with the circumstances under which the failures occurred to state positively that the failure had been from causes other than low water. I will ask you whether or not you have seen crown-sheets prior to this one which in your opinion failed from causes other than low water?

Defendant objected. Overruled. Exception.

A. I think I stated before, or I will state now, that I do not remember ever having seen prior to this one a crown-sheet which I was sufficiently familiar with the circumstances to say that
[209] it had failed from causes other than low water.

(Witness stands aside.)

[210] JERRE WALTON, RECALLED.

Jerre Walton, recalled, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Hunt:

Q. Mr. Walton, I neglected to ask you when you were on the stand to tell us about the grade of this road at the point of the accident. Can you tell us what grade was there?

A. It was about level, I suppose.

Q. About a level grade?

A. Yes, sir.

(Witness stands aside.)

[211] G. W. MITCHELL.

G. W. Mitchell, sworn, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Hunt:

Q. Mr. Mitchell, you live in Christiansburg, I believe?

A. Yes, sir.

Q. Your business is that of an insurance agent, I believe?

A. Yes, sir.

Q. Life insurance?

A. Writing life insurance.

Q. Have you, as such agent, a standard table of mortality, a

mortuary table?

A. Yes, sir.

Q. A table showing the expectancy of a man's life from experience basis?

A. Yes, sir.

Q. For any age given?

A. Yes, sir.

Q. For whatever age it shows his expectancy?

A. Yes, sir; starting with the age of twenty.

Q. I wish you would please state to the jury what the expectancy of a man's life is at the age of 38.

By Mr. Wingfield:

One minute, please. What company issues that table that you are talking about?

Witness:

It is compiled by—

By Mr. Wingfield:

Let us see it.

Witness:

It is compiled by all the old line insurance companies; it is the American experience table of mortality.

By Mr. Wingfield:

Do the old line insurance companies insure railroad engineers?

Witness:

They have different rules about that, most of them do on an endowment policy.

[212] Q. They do not issue an ordinary life policy on engineers, do they?

A. No, sir; that is, some of them do at an increased rate.

Q. How about the National Life of Vermont, that seems to be the one you represent?

A. They won't issue anything under a twenty year endowment on railroad engineers.

Q. And then they charge them an increased premium, don't they?

A. Yes, sir; they write a twenty-year endowment.

Q. And that is the only form of policy they will issue on railroad engineers?

A. Yes, sir; that is the cheapest form they will write, ten-year or fifteen-year endowment, but not ordinary life or twenty pay life.

Q. The reason for that is the occupation of an engineer is more hazardous than that of an ordinary man, isn't it?

A. Yes, sir; it is considered so.

Q. And this table that you have here is made up of the [213] expectancy of the average man in good health, is it not?

A. Yes, sir.

By Mr. Hunt:

Q. Now, will you please tell us the expectancy of a man at the age of 38 as shown by the experience mortality tables, the American Experience Mortality Table?

A. Age 38, did you say?

Q. Yes.

A. It would be 29.62 of a year.

Q. It is close on to thirty years?

A. Yes, sir; practically 29½ years.

(Witness stands aside.)

[214] J. F. SMITH.

J. F. Smith, sworn, for Plaintiff:

DIRECT-EXAMINATION.

By Mr. Hunt:

Q. You live in Roanoke, I believe?

A. Yes, sir.

Q. You are a brother-in-law of Mr. Andrews, the gentleman who was killed by this accident?

A. Yes, sir.

Q. You have known him for how long?

A. Ten or twelve years.

Q. I wish you would state to the court and jury whether or not he was a man that provided for his family?

A. Yes, sir; he always provided well as far as I know.

Q. Will you tell the jury whether or not he was a father that looked after and cared for the education of his children?

A. I have always known him to be such that way, I believe.

Q. What kind of a man was he around the house; did he do things around the house that was necessary to be done?

A. Yes, sir; he was always useful around the house at home.

and attentive to his home.

Q. What about his health?

A. I always thought he had excellent health; I never heard of him being any other way, but a very healthy man. He used to have little headache spells or something like that occasionally, but not very often.

No cross-examination.

(Witness stands aside.)

Plaintiff rests in chief.

[216] DEFENDANT'S EVIDENCE IN CHIEF.

B. O. YEARWOOD.

B. O. Yearwood, sworn, for Defendant:

DIRECT-EXAMINATION.

By Mr. Hall:

Q. What is your line of work?

A. At the present time?

Q. Yes.

A. Machine shop foreman.

Q. What were you doing at the time the engines were built in which engine 469 was included in the order?

A. Inspecting material.

Q. How many engines were built at that time along with No. 469?

A. Ten, I believe.

By the Court:

Is No. 469 the number of the engine here?

By Mr. Hall:

Yes, sir.

Q. Where did you inspect this material?

A. At the Baldwin Locomotive Works.

Q. Were these engines built by the Baldwin Locomotive Works?

A. Yes, sir.

Q. Did you make any tests or see any tests made of the stay-bolt material that went into these engines?

A. Yes, sir?

Q. I wish you would tell the jury what it tested.

A. I couldn't say just off-hand, but we have the test sheet here.

Q. Tell the jury how those tests were conducted and [217] what the tests showed.

A. We took a standard test of a piece of standard bar material the same as went into the stay-bolts and pulled it in the testing machine, the physical test.

By Mr. Staples:

You mean the same material that was actually put in engines was pulled?

Witness:

Yes, sir; the original bar; some of the same material.

By Mr. Staples:

Part of the same bar?

Witness:

Part of the same bar that went into the engine.

Q. What did they show?

A. It showed an elastic limit—

By Mr. Staples:

One minute. He is testifying from some memorandum and I would like to see it.

By Mr. Hall:

Very well; just show it to Mr. Staples.

Witness:

This is the original sheet.

This is a copy. What was it gotten from?

Witness:

Sheets that were made right at the testing machine in the Baldwin Locomotive Works.

By Mr. Staples: What part did you play in the tests?

Witness: I witnessed the tests made.

By Mr. Staples: Is that all you did, just stood there and looked at it?

Witness: I helped to make out some of the test sheets; yes, sir.

[218] By Mr. Staples: You did not make any of these sheets?

Witness: No, sir; but I witnessed them being made out after the test was made and the material was pulled.

By Mr. Staples: Did you actually check these figures on this sheet?

Witness: I have; yes, sir.

By Mr. Staples: I mean, did you do it at the time?

Witness: In a short time afterwards.

By Mr. Staples: How long afterwards?

Witness: The same evening.

By Mr. Staples: What did you check them by?

Witness: By making the calculation.

By Mr. Staples: By making the calculation?

Witness: Yes, sir; and we have the direct reading on the machine for a part of it, the bolts and tests machine.

By Mr. Staples: Did you make this copy; who made that?

Witness: One of our boys that makes the tests, handles the test machine.

By Mr. Staples: Did you compare this copy with the original?

Witness: Yes, sir.

By Mr. Staples: When?

Witness: At the Baldwin Locomotive Works.

By Mr. Staples: When?

Witness: On the date that the test was made.

By Mr. Staples: When was this copy made?

[219] Witness: I think about the 27th.

By Mr. Staples: 27th of what?

Witness: February.

By Mr. Staples: And the test was not made until the 29th; what day was the test made?

Witness: The test was made on the same day.

By Mr. Staples: The test was made on the 27th then, and this here shows the 29th.

Witness: That 29th is a mistake.

By Mr. Staples: If the test was made on the 27th, it was not until two days later?

Witness: That was made on the same day that is dated.

By Mr. Staples: I thought you said the test was made on the 27th; have you any recollection of those tests independent of these figures?

Witness: I have some; yes.

By Mr. Staples: Could you state what they are without these figures?

Witness: Part of them. The elastic limit ran about 24000, I think, or somewhere in the neighborhood of that, and the breaking strength and square inches about 50,000—48,000 to 50,000.

By Mr. Staples: The breaking strength you think was 50,000?

Witness: Near 50,000.

By Mr. Hall: I think he has examined the witness enough to test his competency.

By Mr. Staples: I want to test the witness' recollection.

By the Court: He has answered a number of questions, and there is one question I did not quite catch as to this being a copy. Have you compared this copy with the original on your books?

Witness: I compared it at the time; yes. They make out a copy and make out the original and copy at the same time with carbon and they gave me the copy and kept the original.

By the Court: And this is the copy they gave you?

[220] Witness: One is.

By Mr. Wingfield: This is a carbon copy of the original.

Witness: One is and one is the original.

By Mr. Staples: That is not a carbon copy of that.

Witness: That is made out with a pencil, sometimes they are re-copied when they just make out the original sheet.

By Mr. Staples: You don't know who made this copy?

Witness: One of the Baldwin Locomotive Works men made it.

By Mr. Staples: Mr. Shinn.

By Mr. Staples: Did you check over every figure on here with the original?

Witness: Yes, sir; I believe I did.

By Mr. Staples: Are you positive of that?

Witness: Yes, sir; I am.

By Mr. Staples: What made you do it?

Witness: To see if everything was correct and we were getting proper material that we wanted to go into the boilers.

By Mr. Staples: You could look at the original without looking over the copy, couldn't you?

[221] Witness: Yes, sir; they gave me a copy.

By Mr. Staples: You went there and checked over each of these figures with the original; do you mean to tell this jury you did that?

Witness: Most of them, not all of them.

By Mr. Staples: Who checked the balance of them?

Witness: All of them weren't checked.

By Mr. Staples: And you think from your personal recollection that the breaking strength was 50,000 pounds?

Witness: Between 48,000 and 50,000; somewhere along there.

By Mr. Staples: If this says from 40,000 to 41,000 pounds, it is not in accordance with your recollection?

By Mr. Hall: I do not think this is time for cross-examination.

By Mr. Staples: Then we object to the witness testifying from that sheet.

By the Court: Do you offer that sheet for the purpose of refreshing his memory?

By Mr. Hall: Yes, sir.

By the Court: Go ahead.

Mr. Hall, continuing direct examination.

Q. What were you doing at the Baldwin Locomotive Works; what was your duty there?

A. Inspecting material and the workmanship of the engine.

Q. Who were you employed by and who were you sent [222] there by to inspect the material?

A. By the Virginian Railway Company.

Q. How long did you stay there?

A. Until the order of engines was completed.

Q. What inspections did you make, just in a general way?

A. I seen the material tested in the physical machine, almost all of it.

Q. Did you inspect the workmanship in these engines as they were being built?

A. Yes, sir.

Q. Now, what did the test of the stay-bolt material show as to its strength?

Q. Did you have a copy of the specifications for the strength of the stay-bolt iron that was to go into those engines?

A. Yes, sir.

Q. Did all of those materials test up to the specifications?

A. Very near all of them; yes, sir.

[223] Q. I wish you would please refresh your memory by looking at that sheet and tell the jury what strength the test showed the stay-bolt iron to have?

By Mr. Staples:

Which stay-bolts? If your Honor please, I think the question ought to be limited to the iron that went into this engine.

By Mr. Hall:

I mean the stay-bolts that went into all ten of these engines.

By Mr. Staples:

They are different.

By Mr. Hall:

I cannot pick out each particular stay-bolt that went into ten different engines.

By the Court:

I understood the witness to say that the same material went into all of these engines. Didn't you say that?

Witness:

The first ten engines, the material, all of it, I believe, came in at the same time or very nearly so, and was tested practically at the same time.

By the Court:

And this engine now under consideration was one of the first engines?

Witness:

Yes, sir:

By Mr. Staples:

I would like to ask him another question as the basis of an objection. In what form did the iron come?

Witness:

Just in bars from the rolling mill.

By Mr. Staples: How long were the bars?

Witness: I suppose about 12 feet; I did not measure them—12 to 16 feet.

By Mr. Staples: How many bolts would one of those bars make?

Witness: Five or six, I suppose.

By Mr. Staples: How many bolts are in that boiler there?

[224] Witness: I just don't remember how many are in there.

By Mr. Staples: Do you mean to tell this jury that a test was made of every one of those bars as recorded on those sheets?

Witness: One bar was taken out of every lot.

By Mr. Staples: You tested one bar out of so many?

Witness: Yes; that is the regulation for testing.

By Mr. Staples: Then the bars you actually tested, those identical bars were not used, were they?

Witness: Yes, sir, they were used; not the test pieces, but the balance of the bar was used, the balance of the heat.

By Mr. Staples: You tested one bar in how many?

Witness: I suppose the heat would make different number of bars, sometimes 16 or 18 in a heat.

By Mr. Staples: What do you mean by a heat?

Witness: A billet, so many bars rolled from one square billet.

By Mr. Staples: And you tested one bar and the balance of them you would not test?

Witness: Yes, sir.

Mr. Hall, continuing direct examination:

Q. All of the bars that were rolled from one billet of iron, were all together, were they not?

A. They came in that way to the locomotive works, and were

numbered.

Q. And you took one?

By Mr. Staples:

We object to the answer to that previous question unless the witness can state that he knew these bars came in one pack and that they were rolled from one piece of metal I do not think he ought to be allowed to testify to the fact.

By the Court:

Let me get the point of your objection, Mr. Staples.

By Mr. Staples:

He says that these bars would come in there in bundles, about 16 to a bundle; they would take one bar and test it and wouldn't test any more, and then he said all were rolled from one billet.

By the Court:

What do you mean by one billet. As I understand it, these bars came in there in bundles.

Witness:

So many were shipped in so many lots.

By the Court: You took one of those bars out of so many?

[225] Witness: Yes, sir.

By the Court: And tested that bar?

Witness: Yes, sir.

By the Court: And if it came up to the standard—

Witness: (Interposing.) We accepted it.

By the Court: And you accepted that particular bundle?

Witness: Yes, sir.

By the Court: If it did not come up to the standard you rejected it?

Witness: We rejected the whole lot in that heat.

By Mr. Staples: Do you know of your own personal knowledge that all of the bars in that particular bundle came out of one heat?

[226] Witness: I did not follow them from the rolling mill.

By Mr. Staples: You don't know whether they actually did or not?

Witness: We only take the miller's word for that.

By Mr. Staples:

Then we object to his testifying to that fact because it is just hearsay.

Objection overruled. Plaintiff excepts.

By the Court:

Q. As I understand, this iron was ordered from the factory or somewhere else?

A. From the rolling mill or manufacturers.

Q. And it came there a number of bars packed up together or tied up together?

A. And kept separate for test purposes.

Q. And you took one of those and tested it and if you found it all right you used all the rest of that bundle?

Yes, sir.

Q. If you found it wrong you did not use any of them?

A. That is right.

By Mr. Staples:

What I object to is the witness stating that all of the bars of one of those bundles were made of the same heat or came from the same billet.

A. One billet from the rolling mill; they rolled a number of small ones out of one large one.

By the Court:

Your objection is that you don't know whether all the bars in that roll were prepared at the rolling mill at the same time?

By Mr. Staples:

Yes, sir.

By the Court:

Go ahead.

Mr. Hall, continuing direct examination:

Q. How did those bars show that they all belonged to the same heat, as you call it?

A. By being stamped on it.

Q. What was that stamp on it?

A. They have different stamps on them.

Q. I mean did they have the temperature at which they were rolled stamped on them?

A. No, sir; just the number to identify them.

Q. A serial number?

A. Yes, sir; a serial number.

Q. Are you familiar with the custom of inspecting material in locomotive works?

A. Yes, sir.

Q. How long have you become familiar with it?

[228] A. From practical experience at the works.

Q. How long?

A. I guess I have been inspecting engines up there off and on ever since 1906, as much as ten or eleven months at a time.

Q. Did you see how the inspection is carried on, not only for your engines, but for all other material that comes to the locomotive works?

A. Yes, sir.

Q. Is that the customary way of doing it, to test one bar of the same serial number?

A. Yes, sir.

Q. Now, in making those tests of the stay-bolt iron, I wish you would please examine your sheet and also the specifications under which those engines were built, and state whether or not the strength of that material came up to the specifications.

A. Our specifications here call for 49,000 to 52,000

[229] pounds tensile strength per square inch, and here it tested to 51,640 pounds, and this is within the limit.

By the Court

Is that blue print what you call the specifications?

Witness:

Yes, sir.

[230] Q. Is that blue print the paper that you carried up there with you when you went?

A. That is the exact copy made from the same tracing, and the Baldwin people have a copy of it and I have a copy of it with me to go by.

Q. And your specifications required 48,000 pounds, did you say, tensile strength per square inch?

A. From 49,000 to 52,000 and this is within that limit, it is 51,640 pounds, and it tested within the limit, or I would have rejected it.

Q. If it had been below 49,000 pounds, would you have allowed it to go into those engines?

A. If it was a small per cent and showed a good reduction in area and a good elongation, I would, for it would have been perfectly safe.

Q. Now, from your experience in testing and handling stay-bolt iron, I wish you would please tell the jury whether that was a high quality of iron or not, for the purposes for which it was used?

A. From the experience I have had in testing stay-bolt iron at the Baldwin Locomotive Works, I would consider that first-class iron, for it shows a good reduction and a good elongation.

Q. How about its tensile strength?

A. It is good, 51,640.

Q. Did you accept any that was below 49,000 to the [231] square inch?

A. I do not remember that I did.

Q. Does your record show that you accepted any under that?

A. It does not; no, sir.

By Mr. Staples:

Have you got a record of all the tests that were made?

Witness:

I believe it is in the particular engine; yes, sir.

By Mr. Staples: Engine 469?

Witness: Yes, sir.

By Mr. Staples: How do you identify that with 469?

Witness: This covers the whole lot of stay-bolt iron for that number of engines, and here is the mill number and here is our test of the pieces.

By Mr. Hall:

If your Honor please, we must insist that they do not interrupt our examination; this is the third or fourth time they have done so with this witness.

By the Court:

Go ahead.

Mr. Hall, continuing direct examination:

Q. Did you test the crown-sheet iron?

A. Yes, sir.

Q. What did your specifications require in that?

Q. You haven't got the specifications for the crown-sheet there,

have you?

A. No, sir.

Q. Have you got a test of the crown-sheet iron that went
[232] into that engine?

A. I do not happen to have my copy of it; I think I turned that into the office.

Q. You have two sheets there; does either one of them show the test of the crown-sheet iron?

A. No; neither one of these two.

Q. I will not stop and look for it now, but I will produce it by another witness. I wish you would look at this sheet and state whether or not that shows the test of the crown-sheet iron?

A. (After examining said paper.) Yes, this shows the test of it.

Q. What does that test show?

A. It shows 52,630 tensile strength per square inch.

Q. What tensile strength did the specifications require, if you know?

By the Court:

Does he know anything about that paper?

By Mr. Hall:

It has got his signature to it, I suppose he knows.

A. In the per cent of elongation two of the tests of specimen was 30.5.

Q. How is that? Does that test show good material?

A. Yes, sir.

Q. Is that as good as can be gotten for crown-sheets?

A. As far as I have ever inspected any, it is first-class.

Q. My question was, what strength did the specifications
[233] require. If you haven't got the specifications there before you with reference to the crown-sheet, I will leave that question for the present and ask you whether or not—

A. (Interposing.) Yes, sir; I have it right here.

Q. All right; state what it requires.

A. Not less than 52,000 and not more than 55,000, and our tests of the specimen ran here 52,630, within the limit.

Q. Now, after seeing that material tested that went into this engine, did you inspect the workmanship of it?

A. Only a part of it.

Q. What part of it did you inspect?

A. Just in a general way I inspected the machinery.

Q. You did not inspect the boiler part of it, the crown-sheet and the stay-bolts, after they were put together?

A. No, sir.

Q. That inspection was made by somebody else, was it?

A. By our boilermaker.

CROSS-EXAMINATION.

By Mr. Staples:

Q. Are those bolts heated when the engine is built?

A. Yes; in a forging machine.

Q. That might or might not injure them, might it not?

A. It might be overheated.

Q. If they were overheated it would take the tensile strength out of them?

A. To a certain degree.

[234] Q. You say you made it a custom to allow material to go in that did not come up to the specifications?

A. In a good grade of iron that runs just slightly less, maybe a couple of thousand pounds; all right; and I think, if I remember rightly, the Baldwin Locomotive Works was allowed to run as low as 45,000 pounds by our former superintendent of motive power, Mr. Sanderson, and our specifications were changed and instead of 49,000 the limit was 45,000.

Q. Do you mean that you allowed them to go as low as 45,000, under those specifications there?

A. Not that I remember of.

Q. Were you instructed to allow them to depart from the specifications if you thought advisable?

A. No, sir.

Q. Did you do that in violation of your instructions?

A. I did not go below the instructions I had from the superintendent of motive power, and they still held good at the Baldwin Locomotive Works.

Q. I am talking about these times that you did go below, did you do that contrary to your instructions or not?

A. No, sir; not that I know of.

Q. Did you do it in accordance with your instructions then?

A. There was no instructions issued outside of the specifications.

Q. Then you violated your instructions if you allowed

[235] them to depart from them?

A. We had the specifications that was agreed to at the Baldwin Locomotive Works.

Q. And you allowed them to depart from those specifications?

A. No, sir; not below 45,000.

Q. Didn't you tell the jury a little while ago you did allow them to go below, when the holding power was good?

A. Below 49,000?

Q. I am talking about those specifications that you hold in your hand?

A. I have in some cases, yes; but I do not remember in these lot of engines.

Q. Now, the tensile strength of the bolts and of the crown-sheet is practically the same?

A. Yes, sir; they run somewhere along about the same.

Q. If the bolts are in good and perfect condition and the crown-sheet in good condition, they both should stand about the same amount of strain before they would give way, is that right?

A. I couldn't say; that depends a whole lot on the construction.

Q. If they were properly constructed, I mean.

A. The shape that the sheet is would have something to do with that, I think.

Q. I am talking about the pressure that they will stand, the shape of the sheet does not have anything to do with the pressure the bolts would stand.

A. It should have; the shape it is in, I think.

[236] Q. It might have something to do with the pressure that is exerted but not with the capacity of the bolts?

Q. You have to take it as an individual.

Q. Then the crown-sheet and the bolts ought to stand about the same pressure, ought they not?

A. Well, they both test practically the same.

Q. That is what I mean. Now, what per cent of the material that went into those ten engines did you test?

A. All the stay-bolt iron and all the fire box steel and all the shell plate.

Q. You mean you tested every bar that went into it?

A. No, not every bar; we only tested a speciment out of each heat.

Q. Then you tested one bar out of each bundle?

A. Yes, sir.

Q. And there are fifteen other bars in there that you did not test?

A. There isn't any one that tests them all that I know of.

Q. Then no man can be absolutely certain that some of those fifteen other bars may have been in a bad condition, but that is the best you can get at from your test, isn't that correct?

A. Yes, sir.

Q. What percentage of the raw material that came in did you test; not over 6 per cent of it, did you?

A. Something like that I guess, 6 to 10.

[237] Q. And then 94 per cent of the material that is in that crown-sheet yonder is made out of bars that have never been actually tested, or bolts I mean, isn't that correct?

A. The balance of the lot wasn't tested, of course.

Q. After this material that you saw tested was tested, what did you do?

A. After the material was tested at the testing machine?

Q. Yes; what did you do then?

A. The material was passed and they worked it up into bolts and used it.

Q. What did you do; I am not talking about what other people did, but where did you go after that was done?

A. I stayed right on the job.

Q. On what job?

A. The building of the locomotive.

Q. I thought you said somebody else attended to that?

A. I mean I was there around the engine when the engine was being built; I was inspecting the machinery on the engine.

Q. You couldn't follow up the building of three or four or five engines there; you couldn't follow up and track this material into the engine, could you?

A. No, sir.

Q. You did not try to do that, you trusted to the company to use the material which you saw?

A. And to our boilermaker to see about that.

Q. You trusted to the boilermakers and to the employees [238] of the company to do that?

A. Yes, sir; that is the customary way.

Q. Whether or not they might have substituted other meterial for the material you saw tested, you don't know and couldn't possibly know, isn't that correct?

A. No, we have no exact way of telling.

(Witness stands aside.)

[239] J. C. SHINN.

J. C. Shinn, sworn, for Defendant:

DIRECT-EXAMINATION.

By Mr. Hall:

Q. Where do you live?

A. In Germantown, Philadelphia.

Q. Are you employed by the Baldwin Locomotive Works?

A. Yes, sir.

Q. How long have you been employed there?

A. Since June, 1911.

Q. In February, 1912 did you make any tests of material that went into the ten engines in which No. 469 was included, for the Virginian Railway Company?

A. Yes, sir.

Q. What material did you test that went into that engine?

A. As far as I know, only the stay-bolt material; I do not remember anything else.

Q. How did you test that stay-bolt material; just describe the manner of making the test?

A. One bar is selected from every bundle and from that one bar a piece about 12 inches long is cut off and that is marked off into an eighth inch section in inches, and then that is put in the test machine and pulled, and in that manner the tensile strength of the material is gotten, and then after the tensile strength is gotten the bar is placed together, the broken ends placed together, and it is remeasured, and we find out how much it has stretched, and from that we get the elongation, the percentage of elongation of the material.

Q. Do you make any other test of it besides that?

A. On this material we get the reduction of area, we measure the broken end of the bar to find out what ampere it was, how much it has been reduced, and we also put the bending test on the material.

This bar, about sixteen inches long, was taken and first bent
[240] in the center flat on itself cold, it had not been heated at all, and it was taken and bent the other way flat on itself so that there was two bends, each at right angles to the other of the material.

Q. What did your test show as to the tensile strength of that stay-bolt material?

A. It showed that all of the material tested was very good material, and within the specifications.

Q. Do you know what it actually showed; I mean have you got a record of your tests?

A. Yes, sir; I have it here. For tensile strength per square inch in pounds, it shows 51,640 for the first piece and the lowest piece is 50,760.

Q. What size manufacturing plant has the Baldwin Locomotive Works? Does it build a large number of engines or not?

A. Yes, sir; a large number. It employs about 18,000 men, generally.

Q. Does it rebuild engines for the leading railroads of this country and for foreign countries?

A. Yes, sir.

Q. I wish you would tell the jury how the strength of
[241] that material that went into the stay-bolts in these engines compares with the strength of stay-bolt material that is required by other leading railroads in the country.

By Mr. Staples:

We object to that question. We think the witness ought to show his familiarity with the requirements of other railroads before expressing an opinion of that kind.

Q. You test material for building engines for all the railroads in this country, don't you?

Plaintiff objected. Objection sustained.

Q. What experience have you had in testing material for stay-bolts for engines for the leading railroads in the United States?

A. I was in the testing department for about a year and a half, and a large majority of the material that is not tested by the railroad companies' own inspectors is tested up there.

Q. And during that time were you testing material for all the different railroads?

A. Yes, sir.

Q. Now, answer my previous question as to how the strength of the material that went into these stay-bolts compares with the strength of material used and required by other railroads?

Plaintiff objected.

By the Court:

The witness stated how he tested the iron that went into the stay-bolts in these ten engines?

Witness:

Yes, sir.

By the Court:

You further stated, I think, that you were in the testing department for about a year and a half?

Witness:

Yes, sir.

By the Court:

And that during that year and a half you tested iron that went into the stay-bolts of other railroads frequently?

Witness:

Yes, sir.

By the Court:

That is what I understood him to say.

By Mr. Staples:

He did not state that he tested the iron that went into this locomotive; he tested one little piece out of a bundle.

[242] A. So far as I remember, sir, it compares very well.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. How do you spell your name?

A. S-h-i-n-n.

Q. How many of those bolts or pieces were put up in bundles?

A. As far as I know, I think there were from fifteen to twenty in a bundle.

Q. Fifteen to twenty in a bundle? And how long were those pieces?

A. I think they were fifteen feet.

Q. And you tested a piece eight inches off one end of one piece, is that right?

A. We took 12-inch piece from the end and marked that off in eight inches.

Q. 12 inches instead of 8 inches?

[243] A. Yes, sir.

Q. You took one foot of the fifteen feet out of the bundle of twenty, is that right?

A. Yes, sir; approximately.

Q. You only took one foot of the fifteen feet out of a bundle of twenty, that is what you say?

A. Yes, sir; we took them promiscuously.

Q. In other words, you tested 15 per cent of one piece of the 20-bunch lot or less than 1 per cent of the bundle?

A. That was our usual custom.

Q. And that is what you did in this case. The test you made there was less than 1 per cent of the raw material used, wasn't it?

A. About.

Q. Don't the requirements of all big companies require as much as a 2 per cent test of the material used; isn't that a fact?

A. I do not remember.

Q. You do not remember whether that is true or not?

A. No, sir.

Q. How old are you?

A. Twenty-one.

Q. And you began testing there when?

A. In June, 1911.

[244] Q. When did you begin to work for the Baldwin Locomotive Works?

A. At that time.

Q. Then along about the first experience that you had in testing iron of any kind was on these engines, wasn't it—just along about the very first?

A. It was some months afterwards.

Q. It couldn't have been very long because the engines were shipped here in July, 1911, weren't they?

A. Apparently the Baldwin people thought it long enough.

Q. They might have been right about that; but what I am getting at is this: those engines were shipped here in July, 1911.

By Mr. Hall:

They were not built until February, 1912.

Q. When were those engines shipped here?

A. I don't know. I have nothing to do with that.

Q. As a matter of fact, when you test the piece of iron you go off and leave the whole batch that you think that came out of and you do not have anything more to do with it?

A. No, sir.

Q. As to whether that iron is used, you haven't any more idea than a man in the moon, have you, from your own knowledge?

A. No, sir.

[245] Q. As to whether any part of the iron you ever tested went into this engine is something that you have not and cannot passibly have any idea from your personal knowledge. That is true, isn't it? It is bound to be true, isn't it?

A. Yes, sir; that is true.

Q. You don't know anything about the specifications or their requirements for this shipment, do you?

A. That was a part of what I was supposed to know.

Q. Do you know now what the specifications were?

A. For tensile strength and pounds per square inch, if I remember correctly, they ran 48,000 to 52,000; the elastic limit was 50 per cent of the tensile strength. The elongation was to be 26 per cent in eight inches, and the reduction of area was to be 40 per cent.

Q. You and Mr. Yearwood were there testing at the same time, were you?

A. Yes, sir.

Q. Did you ever meet him?

A. Yes, sir; I met him there.

Q. You all did depart from those specifications at least down to a test of 45,000, didn't you?

A. Not according to this report.

Q. Just leaving that report out of consideration for the present, don't you know, as a matter of fact, it was the practice there to do it?

A. I do not.

Q. Do you deny that it was?

A. I say I do not know.

[246] Q. You don't know much about this anyhow, do you, except the fact that you made some tests up there shortly after you went with the Baldwin people. That is all you know about it?

A. I made the test of this iron and the tests were within the Virginian Railroad's specifications.

Q. Less than 1 per cent of the material was used, one foot in three hundred, less than one-third of 1 per cent was your test, wasn't it?

A. It was our general custom.

Q. That is the test you made in this case. Stand aside.

(Witness stands aside.)

[247] R. L. BOWDEN.

R. L. Bowden, sworn, for Defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. What line of work do you follow?

A. I am a boilermaker.

Q. How long have you been a boilermaker?

A. About twenty-five years or a little over.

Q. Tell us in a general way where you have worked as a boilermaker?

A. I have worked in Norfolk about nine years in the marine shops in building steamboat boilers and all classes of work and all classes of boilers, including locomotive boilers, and then I worked in the railroad shops for something like seventeen years.

Q. Were you engaged in boilermaker work during all that time of seventeen years on locomotives?

A. For the last sixteen, about seventeen, years I have been in locomotive shops, altogether.

Q. Who were you employed by in February, 1912?

A. By the Virginian Railroad.

Q. Did you go up to Philadelphia to inspect ten engines that were built at the same time when engine No. 469 was built?

A. Yes, sir.

Q. I wish you would tell the jury what test you made of those engines; in the first place I wish you would tell whether you watched the workmanship on those boilers, and inspected them as they went along?

[248] A. That was my business up there, to see and follow up the workmanship and inspect the work as it was performed on those engines.

Q. How long did you stay there?

A. I went there in March, from March, I reckon, up until June.

Q. Did you have anything else to do during that time except inspect the boilers and the workmanship on those boilers?

A. No, sir.

Q. How were they built, were they properly built or not?

A. Yes, sir; they were well-built boilers.

Q. How about the crown-sheets and the stay-bolts, were they properly put in?

A. Yes, sir.

Q. Did you make any test of that before they were taken away from there?

A. Yes, sir; after the boilers were completed I would go over them while the work was being performed until it was all completed, and of course, the rivets and the corking I tested with a feeler to see that the iron was all right, and the rivet head was put properly, and also the crown bolts that had heads to them, I tested them in the same way I did the rivets, with the feeler to see that the head was put to the sheet all right.

Q. What is that that you call a feeler, describe it.

A. It is a piece of metal gotten down; it is about, I think,
[249] the one that I used there, was six one-thousandths or something like that.

Q. Six one-thousandths or six one-hundredths of an inch?

A. Yes; six one-hundredths—just as fine as you could scale. And after the boilers were built they were sent to Eddystone to be assembled with the engines.

Q. Where is Eddystone? What do you mean by that; the jury do not understand that?

A. That is a little different shop from the one the boilers were erected in.

Q. The boilers are erected in one shop and then they are sent to another shop, are they?

A. To another depastment or another shop, to be assembled on the frames, and there they were washed out and cooked out with soda and tested by steam.

Q. Tell us about cooking them out with soda. Why is that done?

A. We cook them out in order to clear them of grease or any oil that would go in while they were drilling or tapping the stay-bolts.

Q. Is it necessary to use oil in drilling the stay-bolt holes?

A. They use oil in drilling and in tapping the holes, you know, to protect the tap.

Q. Does that sometimes deposit some grease around the stay-bolts?

A. The grease will run through inside; somewill of
[250] course naturally drop from the tap, and that is why we cook them out with soda to destroy the grease.

Q. Does that do it?

A. Yes; it leaves them in a pretty nice, dry condition when it is all over.

Q. How do you boil them out with soda or steam them out with soda; what do you do?

A. We put soda in the boiler and then boil the water in the boiler.

Q. You boil it?

A. Yes, sir.

Q. After you get through with that, did you get into these boilers and examine them to see whether they were cleaned out right or not?

A. Yes, sir.

Q. Was there any grease left on the crown-sheet?

A. No, sir.

Q. Any scrap material or anything of that kind left on it?

A. No, sir.

Q. Now, describe your water test that you put them through after the other tests.

A. After the steam test we put them to a test of 285 pounds of water.

Q. 285 pounds?

A. Yes, sir; to see if there is any leak or defect in any way about the boiler.

Q. Is that above steam pressure or below it?

[251] A. It is above steam pressure.

Q. Why did you make that water test of it?

A. Why did I make it?

Q. Yes, sir.

A. To be sure that the boiler is properly built and has the proper strength to hold the steam pressure, as a factor of safety.

Q. What is the steam test? How high do you increase the pressure in that?

A. I think we run that steam test up to 220 or 240, I disremember. I haven't got any of the tests with me.

Q. Up to 220 or 240?

A. Yes, sir.

Q. What is the pressure carried on the boiler when it is in service?

A. Its working pressure is 200 pounds and the steam test is 220 pounds.

Q. You mean that it is built for 200 pounds?

A. Yes, sir.

Q. Does it always carry that much in service?

A. No, sir; we carry on that class of engine—we have been carrying 185 and 187 pounds; that is what we set the pops at, we have two pops, one set at 185 and the other at 187.

Q. Now, did this engine 469 stand both of those tests all right?

A. Yes, sir.

Q. If there had been any defect in the boiler or any weakness in the material that could not stand a pressure of 185 pounds,

[252] would it have shown under those two tests?

A. I should say it would.

Q. Now, when did you inspect this engine 469 again?

A. I don't know for sure when she was inspected; they had our inspectors there to inspect it once each month.

Q. Did you inspect this engine after the failure?

A. Yes, sir.

Q. Who was present when that inspection was made?

A. Mr. Lewis and Mr. Slayton, and I wont' be sure whether Mr. Houston was there at that time or not, and the Interstate Inspector.

Q. That is the United States Government inspector?

A. Yes, sir.

Q. What did you find when you inspected it then?

A. I found the crown-sheet was down and the bolt heads had pulled off and I just found the engine as you see the sheet there; it showed that the bolt heads had been hot and also the crown-sheet.

Q. Were any of the bolts broken anywhere except at the heads?

A. No, sir.

Q. Right under the heads?

A. No, sir.

Q. I wish you would state whether or not the bolt heads on the entire area of that sheet that has been forced down by the explosion—this is, all of the bolts that failed in that explosion—were the heads of all of them pulled off right in the heads of the bolts?

A. Yes, sir.

[253] Q. Were any of the stay-bolts at all broken?

A. Every head was pulled off.

Q. What condition were those stay-bolts in when you made that inspection?

A. The stay-bolts were in perfect condition, only right at the ends where they were pulled off; they showed a little pull right on the ends there, and also showed the heat for about an inch and a half up

the bolt; it was discolored for about an inch and a half, at least the coloring of the head had run up into it, a blue color, on the bolt, and it colored a little on the end as it pulled off, just like a hot piece of iron would do.

Q. What does that blue color indicate that runs up on the bolt about an inch or more?

A. It indicated that the bolt was heated and the heat gradually ran up the body of the bolt.

Q. Did that show on the stay-bolts over the entire broken area?

A. Yes, sir; some of them wasn't as high up as others, some of them only just showed a very short place, and others were up about an inch and a half.

Q. You mean the color did not extend up on all of them the same height?

A. No, sir.

Q. On which end of the sheet did it extend up further?

A. Why, down along the front end there was where it [254] looked the hottest.

Q. Is that the highest part of the sheet?

A. Yes, sir.

Q. Is that the part of the sheet that is first exposed when the water gets low?

A. Yes, sir; that is the part that is connected to the flue sheet, and the flue sheet supported that end up on the flue sheet and that is the highest end of the crown-sheet, supported underneath by the flue sheet and the crown-bolts above.

Q. What portion of the front of that sheet where it is supported in front had pulled loose?

A. The flue sheet itself came down with it but never broke loose from the flue sheet, the flue sheet doubled over with it as far as it was heated, down to the first row of flues.

Q. What experience have you had in handling boilers; I mean handling burned crown-sheets—that is, crown-sheets that have been heated to a hot heat without water on top of them?

A. I do not think so. I never seen any that indicated being dry.

Q. Read the question. I do not think you understood me.

(Question is here read to the witness.)

A. I never seen any but what was heat without water on it.

Q. You do not hear well, do you?

[255] A. No, sir.

Q. My question is, how long have you been doing the

kind of work that brings you in contact with burned crown-sheets?

A. I have been in it for the last sixteen or seventeen years.

Q. Have you seen many crown-sheets that have been burned?

A. Yes, sir; I have seen a good many, but not very many for that extent. I have seen one burned a good deal worse too, where it came down to the fire box, but I have seen many a sheet that was burned slightly.

Q. Have you seen many sheets that were burned to the point of failure?

A. Every one I have ever seen burned at all was a failure to a certain extent.

Q. It was a failure to a certain extent?

A. Yes, sir.

Q. You mean part of it went down?

A. I have seen them burned so that it did not go down; I have seen them burned; I have known them to be fired up with no water and there would be no pressure and did not show any indication, no pocketing or anything of that kind, because no pressure there to do it. Of course, it would make the boiler leak and we corked them up on that account, and I have seen them burned and just scorched, a little pocket maybe, just enough to notice it. Of course, I have
[256] never seen it that way but what it did not leak, and so if it pocketed much we had to renew the bolts.

Q. You say you have never seen but one sheet that had as much area on it burned as this one?

A. No, I don't know as I ever saw but one that went down any lower than that.

Q. How do you account for this one holding long enough for that area to be burned?

A. From my experience I would say that this sheet got hot first, being its thinnest part, and the water got off it, got down to that level from the looks of it and the water was off the sheet just that far, as far as we could see it bent down there, and the sheet being thin that heated up first, and the bolts, there was more stick in the bolts than there was in the sheet, it taken them a little longer to heat, and of course the pressure started to show down between the bolts after that was heated. That is my theory and experience in boilers that have been burned; and then as the bolts gradually got hotter they became weaker until they finally weakened to such an extent that they could not hold the pressure and they dropped, and by doing that it made an impression around the holes on the sheet.

Q. Now, if that sheet had been burned and the threads pocketed

between the bolt holes, as you see it is pocketed, I wish you would tell the jury whether it would leak or not.

A. Yes; I have never seen any one burned to that extent that did not leak, not in my experience.

Q. What has to be done with them when they are burned
[257] that way?

A. Whenever they are pocketed that much we have to renew the bolts.

Q. Can you operate an engine that is pocketed that way?

A. No, sir.

Q. Why not?

A. Because it would leak so that you couldn't keep water in there and the engineer couldn't handle it.

Q. Now, what was done with this engine when it was brought into Princeton, or from the time it was brought to Princeton until the Interstate Commerce Inspectors came?

A. That engine was run up into the shops where we put a curtain around it to keep any one from getting around there until the Interstate Commerce Inspectors came down there.

Q. You fastened it up, did you?

A. Yes, sir.

Q. Do you recognize these bolt heads as being the ones that were picked up there when you brought that engine to Princeton and made this inspection.

A. Yes, sir.

Q. Where were they?

A. They were down in the ash pan and around over some of them on the grate and about in the fire box.

Q. I want to ask you this question, in your experience of twenty-five years in boiler making, did you ever see bolt heads pulled off like that when the crown-sheet had not been burned?

A. No, sir.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. You are employed by the Virginian Railway now?

A. Yes, sir.

Q. How long have you been working for the Virginian?

A. I have been there a little over seven years.

[258] Q. Where did you work before you went there?

A. For the Seabord Airline.

Q. How long did you work for them?

A. I worked there nine years.

Q. Who did you work for before that?

A. I worked at different places. I worked for a contract shop in Alabama, and I worked in Selma, Alabama, for the Southern Railway.

Q. Has your hearing got any better in the last few minutes?

A. No, sir; I do not think it has got any better.

Q. You heard me when I asked you those other questions all right, didn't you, when I was talking over there and asking you these questions as to where you worked, you heard me all right, didn't you?

A. Yes, sir.

Q. When you examined this engine it was cold, wasn't it?

A. Yes, sir.

Q. It wasn't hot when you got to it, was it?

[259] A. No, sir.

Q. What do they mean by an engine being buckled or a boiler being buckled?

A. What I would call buckled or pocketing would be between the stays; that is, bulged down.

Q. It is not an uncommon occurrence to see an engine buckled, is it?

A. They do if they get heated enough.

Q. You see it quite often, don't you; you have seen many a one?

A. Yes, sir.

Q. You have seen them come into your own shops on their own steam, haven't you?

A. I don't know about that. We had one that came in there that had been scorched, under its own steam.

Q. They do use them occasionally, and you have seen them at work on the road after what they were called buckled?

A. This one came in there but never brought any train; but he brought the engine in.

Q. The engine came in and it held water, didn't it?

A. He brought it in to be worked on.

[260] Q. That was the one that Mr. Keezer brought in?

A. Who?

Q. Mr. Keezer.

A. No, sir; I don't remember him bringing it in.

Q. Do you remember the engine that Mr. Keezer was supposed to have burned?

A. This engine that I speak of was 429.

Q. I don't know the number, it may be 4029, I don't know the number of it; but don't you remember the engine that Mr. Keezer was charged with burning for the Virginian Railway? Do you or not?

A. No, sir; I do not remember it.

Q. You told us this then, that one engine that was buckled came into the shop under its own steam, didn't you?

A. Yes, sir; of course, it wasn't buckled to any extent; it was scorched enough to make it leak.

Q. It was buckled some?

A. Only two places, between two stay-bolt holes, that you could discern it was done.

Q. Well, there was some buckled?

A. A little bit.

Q. You say you were up in Philadelphia when these engines and boilers were constructed; you did not do the testing of the iron, did you?

A. No, sir.

[261] Q. And don't know anything about that?

A. No, sir; I never tested iron.

Q. You were there to supervise the construction?

A. I was only to inspect the mechanical work as it went on, as the engines were built.

Q. Had you ever done any work of that kind previously for the Virginian?

A. No; I never done any inspection for them; that was my first trip up there.

Q. You did not drive these bolts in yourself, or did not put them in?

A. No, sir.

Q. You let the other men wear the overalls on those occasions, didn't you?

A. They all wear overalls, I think.

Q. You were not there while all of the bolts were put in, were you?

A. I had an assistant there; he was on at night time and I was on in the day time.

Q. And at least you did not have an opportunity to see more than one-half of them, did you, your assistant being on at night and you in the day?

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A. I did not see over one-half of them put in, I do not suppose; I could not state just how many.

Q. How many engines were they building at one time?

[262] A. We had ten.

Q. Under contract at one time?

A. Yes, sir.

Q. And they were being built around at different parts of that great big shop there, weren't they?

A. Yes, sir.

Q. And no living one man could see all of the bolts that went in there if he was sent there for that purpose?

A. It would be a hard matter to see them run every bolt in.

Q. Wouldn't it be a physical impossibility for one man to watch the driving in of the bolts of ten boilers at one time; how could he do it, Mr. Bowden?

A. One man couldn't see that; he couldn't see them put all of them in.

Q. He had just as well have been in Princeton as far as seeing each bolt was concerned?

A. But I inspected them after they were put in.

Q. Your inspection was after the bolts were really put in, wasn't it?

A. Of course, I saw a good many put in, but I don't say that I saw all put in.

Q. You saw a powerful small percentage put in?

A. I saw one-half or more than one-half, I suppose.

Q. More than one-half of the bolts in each of those ten engines, when you were only on half the time and they were constructing ten boilers at once?

A. They weren't putting the bolts in all the time; they

[263] had one engine advanced further; they were doing a certain class of work on one engine while they were doing another class on another.

Q. You didn't watch anything but the putting in of the bolts?

A. Yes, sir; I done all I could.

Q. Could you be there watching these other ten engines while they were working on the other engines, and watch them put in the bolts; you couldn't do that?

A. Of course, I couldn't be in two different places at one time.

Q. Of course not; the law of physics wouldn't permit you to do that.

A. In regard to the building of those boilers I started to say; when they are building boilers they advance one ahead of the other all the time and they finish them up one at a time, and then we would run one out today and maybe tomorrow we would run another one out that way, until they finished them all.

Q. And you had the same thing to supervise during the entire time of the construction of the ten engines, didnt' you?

A. I would go down into the shop and go over what work was done, the riveting and things of that kind that was done on the boilers at night, or what my young man had left off, that was down there with me; I would go over them and then follow them up until [264] I got up to the last boiler they were working on.

Q. You would see the work after it was done and some of it while it was being done?

A. I saw part while it was being done; I didn't see all of course.

Q. You didn't see anything like half?

A. It wasn't far from it.

Q. Where was it you said they assembled the parts together at?

A. In the Eddystone shop, a different shop a little ways out of Philadelphia City; it is a new shop they have got there.

Q. While they were assembling the parts together at Eddystone were you there?

A. Yes, sir.

Q. Were they working on these boilers, the ones that had not been finished back in Philadelphia, while they were assembling the parts at Eddystone?

A. They sent them down to Eddystone to be assembled to the frame, and they lay there until they got all the frames and material ready for assembling.

Q. While they were assembling the engines at Eddystone, were they working on parts of these ten engines back in Philadelphia?

A. They might have had a few in Eddystone before they finished the last ones in Philadelphia.

Q. And you sure couldn't be in Eddystone and Phila- [265] delphia at the same time, could you?

A. No, sir.

Q. Now, you said after they assembled them together they washed them out with soda?

A. Yes, sir.

Q. Who did that?

A. The man in charge at Eddystone.

Q. How much soda would he put in them?

A. As well as I remember they put from eight to ten pounds.

Q. You don't know how much soda they put in?

A. Somewhere about eight or ten pounds to the engine.

Q. You were not inspecting the work, were you?

A. Yes, sir.

Q. You didn't tell them how much soda to put in?

A. No; I couldn't tell exactly now how much; I did know, but I never kept no memorandum of it.

Q. And you don't know how much was necessary, do you?

A. I put in as much as I thought was necessary.

Q. You didn't fill it up?

A. No, sir.

Q. Now, while they were cooking it out with soda, where were you?

A. I was there in the shop.

Q. There in the shop while they were cooking it or in Philadelphia?

A. I was there where they were cooking the engines out; [266] I witnessed the test out there.

Q. How many of these engines did you see cooked out with soda?

A. I saw the ten we had built down there.

Q. Did you see all ten cooked out with soda?

A. Yes, sir.

Q. You say you went into that boiler after they were cooked with soda?

A. Yes, sir.

Q. How did you go into it?

A. They taken the dome cap off and I went in on top.

Q. And that let you down into the crown-sheet?

A. That lets you down on the flues, and then we taken out all the wash-out plugs and arch pipe plugs and all the plugs in the boiler.

Q. That did not let you down on the crown-sheet?

A. Yes; that lets you down on the flues and you go to the crown-sheet.

Q. You told Mr. Hall there were no scraps or waste material left on the crown-sheets of any of those boilers, didn't you?

A. None of that lot; no, sir.

Q. Do you recall one of that lot of engines that went down with water on the crown-sheet, in the yard at Princeton, due to the

fact that there was waste material left on the crown-sheet, and that you all opened it up there and found waste material?

A. Yes, sir; I remember that we had one that got a
[267] scorched spot on it from borings on the crown-sheet, but that wasn't in that lot of engines; it was a later lot of engines we had built.

Q. What was the number of that engine?

A. 473.

Q. Do you say that engine 473 did not come with this shipment of ten engines?

A. No, sir.

Q. Now, when was it that that engine went down?

[268] A. What engine?

Q. The one that burned on the yard with water on the crown-sheet, in the yard at Princeton?

A. No. 473 got a scorched spot on the crown-sheet right over the fire door, pretty near, a little to the right of the center, and it was detected from the bolts leaking.

Q. When they discovered it had gone down from waste material and stuff left on the crown-sheet, didn't they go into the other engines of that same shipment?

A. They found that engine leaking and they went in and inspected it; we taken all the plugs out and—

Q. (Interposing.) If I am not talking loud enough I will talk a little louder.

By Mr. Hall:

Let him finish his answer.

A. We found some sediment of borings that had lodged on the sheet, a spot of it around, and we taken out, I believe we taken out six bolts out of that engine.

Q. Which failed on you on the yard, with water over the crown-sheet, didn't it?

A. Yes, sir.

Q. Didn't you just now say that you never had seen a crown-sheet that had been scorched except one that did not have water on it; did you say that or not?

A. If there is sediment on the sheet enough that the water don't get on the sheet—

Q. (Interposing.) Will you please answer my question?

[269] Did you or not tell Mr. Hall that you never had seen a

scorched or burned crown-sheet when there was water over the crown-sheet?

A. I said on the sheet.

Q. You said on the sheet? Is that what you said?

A. Yes, sir.

Q. It is perfectly possible then for an engine to be scorched and burned full of water, is it?

A. If you have got anything to keep the water away from the sheet it is bound to burn.

Q. After you all discovered those scrapings and borings were in that engine, didn't you go into this very engine that failed here and examine it for scrapings and borings?

A. Which one?

Q. What is the number of this engine that failed?

A. This one there?

Q. The one that had that crown-sheet in it.

A. That was 469.

Q. Did you go into that one?

A. I went into that one and inspected it thoroughly.

Q. After this failure at Princeton yard?

A. No, sir.

Q. Before that?

A. Yes, sir.

Q. Is that the only time you went into that engine, at the point of manufacture?

A. Yes; and I know there was no borings in it when I [270] went in it and inspected it personally myself.

Q. This engine 473 which failed on the Princeton yard had been submitted to the identical inspection and treatment that engine 469 had, hadn't it?

A. I couldn't tell you; I wasn't there when it was built.

Q. Now, please tell me, after this engine was burned, in the yard at Princeton, whether you did not go in most all of your engines and inspect them to see whether there was any borings on the crown-sheet?

A. I went in all of the last lot that came in; yes, sir. We taken them and opened them.

Q. Didn't you go into the other lot also?

A. I don't remember about that.

Q. Didn't you go in and inspect the very lot you inspected in Philadelphia; didn't they do it?

A. I don't remember.

Q. Do you say they did not?

A. I never did.

Q. I am not talking about you; but wasn't it done at your shops and don't you know it was done?

A. Not to my knowledge, not the old engines were not.

Q. I mean the engines that were in the shipment with the lot of 469, the engine that went down while Mr. Andrews was driving it.

A. I remember having all of the engines that came in the last lot gone through after we found that this one had a scorched place on it, but I do not remember of going through any others.

[271] Q. The engine that was driven by Mr. Richardson, who has testified in this case—Mr. F. A. Richardson, you know him, don't you?

A. Yes, sir.

Q. He drives one of the engines that came in this lot, with the lot of ten that this engine came in, doesn't he?

A. I don't know what engine he has got now.

Q. I mean the engine he had in 1912, in November, 1912.

A. I couldn't tell you what engine he ran then at all.

Q. Didn't you, after you found these filings and scrapings on the crown-sheet of engine 473, didn't you go into the engine that Mr. Richardson drives and wasn't that engine one of this lot that came with 469?

A. I couldn't say; I don't know what engine he was running.

Q. You don't know whether that is true or not?

A. No, sir.

Q. You say that the crown-sheet, in your judgment, over here got hot, except the bolts?

A. The bolts got hot too.

Q. For how far up?

A. It showed on the bolts about an inch and a half, the last shade of the heat was about an inch and a half.

Q. Now, weren't the heads of those bolts heated when they were put in, in the construction of the engine?

[272] A. The bolts were made—yes, they were heated when they were made in the machine, but they did not heat them to put them into the engine.

Q. Didn't you have to cut off that socket at the end of those bolts about that long (indicating)?

A. No, sir; as a general thing they are nicked and screwed up until they are tight enough and until that twists off.

Q. This thing here you mean (indicating)?

A. Yes, sir.

Q. And they screw them up until that twists off?

A. We generally have a nick around there, leave enough stuff there to hold.

Q. And you screw that until this end twists off?

A. Yes, sir.

Q. And you do not have to heat it?

A. No, sir.

Q. Who was the engineer on 473?

A. I don't know who was running that engine at that time; I couldn't tell you.

Q. Have you any way you could tell me?

A. I could find out by looking over the roundhouse reports; that is the only way I know of.

Q. That is the only way you can give me the information on that subject?

A. I don't keep any records along that line.

[273] Q. You know whose engine that was that burned in the yard; that was common knowledge among all of the men, wasn't it?

A. No, sir; I couldn't tell you who was running it at all.

Q. You never heard?

A. If I did I don't remember.

Q. Now, you say this sheet in your judgment was hot, and that is the reason it went down?

A. Yes, sir.

Q. Now, Mr. Bowden, what is the effect of bolts that are screwed in the sheet, if the bolts pull out, what effect does that have on the threads in the sheet, if it is pulled out while the sheet is hot?

A. It would depend on how the sheet had stretched and how much the holes had stretched before it pulled out. Now, if the heated bolt or stay bolt will pull out of the sheet, it generally destroys the thread on the bolt when it strips through; I never seen any pull out that way, only these crown-bolts, is the only thing I ever saw pull out and the heads pull off.

Q. This accident here is the only one you ever saw where the heads pulled off?

A. The only bolt heads I ever saw pulled off except one or two where the engines had been heated. I saw an engine once that broke off two bolts from being heated, only broke two bolts.

Q. And if I understand you correctly, this crown-sheet

failure is the only one that you ever saw wherein the head of the bolt pulled off that way, is that true or not?

A. The only one I remember—no, I remember one com-
[274] ing all the way down, and it pulled all the bolt heads off.

Q. Where was that?

A. On the Seaboard.

Q. When was that?

A. It has been several years ago.

Q. They didn't have any button-heads then, did they?

A. Yes, sir.

Q. When was it?

A. I couldn't tell you; I don't remember the date; but it was while I was working for the Seabord Air Line Railroad.

Q. You haven't told me about the effect it is bound to have on the threads of the sheet if the sheet is hot, if it is red hot; what effect would it have on the threads in the sheet?

A. It depends on how much the sheet would stretch, and if the bolt head itself would not support the sheet until it pocketed down; it might stretch the holes so large it wouldn't touch the threads at all.

Q. The heat wouldn't let it get away from there until it pulled the head off?

A. The holes could enlarge.

Q. The holes would lay there and stretch because it
[275] couldn't get by the bolt heads?

A. The head could hold it and if the sheet was to get very hot and heated right quick.

Q. Until the head pulls off that part of the sheet up against which the head is, that cannot get by, cannot sag down until the head comes off or the bolt parts one, can it?

A. That is the way I spoke of it, to pocket down, the iron stretches when it comes down between the bolt holes and—

Q. (Interposing.) I am not talking about that.

By Mr. Hall:

But that is what he is talking about.

A. Whenever it comes down between the bolts it is bound to enlarge the hole and leaves it less. That is a matter of practical experience in crown bolts that have been burned, that they enlarge the holes and leave the threads not holding, while the head of the bolt will hold in there unless they get heated to such an extent that they become so weak they cannot hold the pressure.

Q. Now, coming back to my question. That part of the plate

immediately above the bolt head, that cannot sag down until the bolt head gives way or until the bolt one gives way, can it?

A. No, sir; not right under the bolt head, that will hold just as long as the bolt head will hold it up there, of course.

Q. Now, then, if that cannot give way until the bolt head
[276] gives way, when the bolt head does give way what effect is that bound to have on the threads in the sheet, if the sheet is hot?

A. That wouldn't necessarily have any effect on the threads if this bolt fitted the bolt tight enough for the bolt to destroy the threads.

Q. If it fitted the bolt tight what effect would it have on the threads in the sheet?

A. If it fitted the bolt tight it wouldn't pull down if the threads held it.

Q. It would strip, wouldn't it?

A. I never saw them stripped with the head on.

Q. I said the head had given away and there is nothing in the way but the threads; I say what effect will it have on the threads in the sheet when the head gives way from the bolt and there is a failure of the crown-sheet?

A. If the crown-sheet was hot—of course if it got hot enough the bolt head would come off after the bolt head got hot, the pressure would let that down.

Q. Let's get off the bolt head and go back to the thread. What effect would it have on the thread in the crown-sheet?

A. It wouldn't effect the thread if the hole had expanded enough to get away from the bolt.

Q. If the hole in the crown-sheet fitted the bolt and it had not stretched, what effect would it have on the thread in the crown-sheet?

A. If it was pulled out?

[277] Q. Yes, sir.

A. Cold?

Q. No, we have been talking about a hot sheet so long I thought you knew that. I said when the sheet—

A. (Interposing.) I never saw a bolt that the thread fitted after the crown-sheet was once heated.

Q. Now, please, Mr. Bowden, the sheet that I am asking you about is a sheet which you say was hot. I am not asking you about any cold sheet. The hole that I am asking you about is a hole that fits the bolt. The threads I am asking you about are the threads in the crown-sheet. I asked you that if the head of that bolt pulls off and the bolt with the threads on it pulls out of the crown-sheet while

the crown-sheet is hot, what effect is it bound to have on the threads in the crown-sheet?

By Mr. Hall:

We object to the question because the witness has just answered the question by saying they never fit up when they are hot.

By Mr. Staples:

Let the witness protect himself, Mr. Hall.

Q. The Court says that you can answer my question.

By the Court:

If you do not understand the question the stenographer will read it to you.

A. Well, please read the question.

(The question is here read to the witness.)

A. It wouldn't have but very little effect on the threads in the crown-sheet.

Q. Why?

[278] A. For the simple fact that the hole would be expanded so much that the bolt would not destroy it.

Q. My question to you is predicated upon the idea that the hole in the crown-sheet is not stretched. Get that in your head; it is predicated upon that one idea that the hole in the crown-sheet is not stretched. Now, I ask you if it pulls out what effect must it have on the threads in the crown-sheet?

A. I couldn't answer that question, because I never seen a bolt pull out of a crown-sheet that fitted tight that was hot, and I cannot answer the question.

Q. Is it possible to heat a crown-sheet unless you heat the bolt or that portion of the bolt that is in the crown-sheet?

A. Of course, if you heat the crown-sheet you will heat the bolt too.

Q. The hole in the crown-sheet gets larger upon the theory of expansion, doesn't it?

A. Yes, sir.

Q. What does that bolt do, while the hole in the crown-sheet is expanding? Does the bolt stay there and hold its hold or expand also?

A. It expands also but not as much as if the sheet pockets.

Q. Suppose the sheet isn't pocketed, how about it?

[279] A. Then I do not think they would pull out.

Q. That is the question I am asking you about.

A. I never seen one that did pull out.

Q. You never saw an instance of that kind, and if there are any holes in that crown-sheet the bolts would fit in now—

By Mr. Wingfield:

(Interposing.) He never said that.

By Mr. Hunt:

I asked him that.

A. I never seen a bolt out of this crown-sheet that the crown-sheet wasn't pocketed between the bolts.

Q. If that is the way you insist on answering, I am going to drop it at that. Mr. Bowden, where are some of those long bolts that were in that boiler beside these two here?

A. Some of them are at the shop.

Q. In the scrap pile?

A. Some of them are along in the shop there, just on the ground, laying on the shop floor.

Q. Why didn't you bring those here?

A. I didn't think it was necessary, I don't reckon.

Q. What did you do with some of those bolts?

[280] A. I haven't done anything, only I had them taken out

Q. What did you see anybody else do to them?

A. Nothing.

Q. Have you been the custodian of those bolts?

A. Part of them that has been in the shop all the time

Q. Have you been the custodian of these two that were brought in here?

A. Yes, sir.

Q. Up until when?

A. Until I turned them over to Mr. Slayton.

Q. When was that?

A. I had them sent to his office, I believe; maybe a week ago.

Q. Why did you let them lay out in the weather and rust that way?

A. Because I did not think they would be of any service, and some of them were used up as material—all that was long enough as being good material, we used them up, the blacksmiths did.

Q. You didn't preserve them and you never attempted to preserve them for evidence in this case, did you?

A. No, sir; not after they were taken out, we did not.

Q. Who gathered up the bolt heads?

A. I gathered up a part of them and I suppose Mr. Slayton

and Mr. Lewis might have picked up some; I know two or three of us picked them up in the fire box.

Q. Which ones did you gather up?

A. I couldn't tell you.

[281] Q. As a matter of fact, you couldn't tell whether you gathered up a single one of those, could you?

A. Not all of them, I couldn't tell whether I gathered them up.

Q. I didn't ask you about all of them, I asked you about any one that you gathered up.

A. I gathered up some of the lot; I couldn't identify any regular bolt that I picked up.

Q. Now, if you couldn't identify the nut and bolt or head that you picked up, how do you know you picked up any of these; you may have picked up others, but how do you know you picked up any of these?

A. We saved all that we picked up in the fire box.

Q. Who is we? Did you pick up and save a single one of those bolts there out of engine 469?

A. If that is all we had in the box, I did.

Q. Regarless of whether it is all he had in the box, God knows I will never know. Did you pick up and save a single one of these bolt heads that are laying on that table; you don't know, do you?

A. Not unless I knew—I saved part of them that he had there in that little box. I couldn't say I picked all of them up, because I picked up a part of them.

Q. Can you swear under your oath that you ever saw either one of these bolt heads before this trial?

A. Yes, sir.

Q. Which one did you see?

A. All of them.

[282] Q. Where?

A. In the shop. I kept them in my office for several months.

Q. You kept them in your office?

A. Yes, sir.

Q. How do you know they are the same ones?

A. I kept them there and I turned them over to Mr. Slayton and he kept them there and then they were marked.

Q. How do you identify a single one of those bolt heads?

A. They have got a mark on them.

Q. What mark is it?

A. There is a chisel mark right there (indicating).

Q. Now, hasn't that mark been put on these bolt heads since the last trial of this case, in Roanoke?

A. Yes, sir.

Q. Now, that being true, that the mark which you identify the bolt by, knowing that you saved and preserved it as a mark and it has been put on since it left your possession, how can you identify it by that mark?

A. We put the marks on there when they were taken out of the box, and they were sealed in the box again and kept in his office.

Q. That was after the trial in the Federal Court in Roanoke, wasn't it? You know that is true, don't you?

A. These are the bolts that were picked up.

Q. You still believe they are, do you?

A. Yes, sir.

Q. Now, Mr. Bowden, these were an inch and an eighth [283] bolts in this sheet, weren't they?

A. Inch bolts.

Q. An inch and an eighth?

A. Yes, sir.

Q. They are stronger than an inch bolt, aren't they?

A. They would hold more pull; yes, sir.

Q. They would hold eight times as much, wouldn't they?

A. No.

Q. Wouldn't they hold that much?

A. No, sir.

Q. How much more would they hold?

A. I don't know; I couldn't say.

Q. Then how do you know they wouldn't last eight times as much?

A. I know they wouldn't hold that much.

Q. And you don't know how much more they would hold?

A. They would hold some more.

Q. If you don't know I don't want you to guess.

A. I couldn't say.

Q. Who did you say was with you when you inspected this boiler at Princeton?

A. Mr. Lewis.

Q. Which Mr. Lewis is that?

A. S. H. Lewis.

Q. Who is he and where does he stay?

A. He is the assistant superintendent of motive power.

By Mr. Hall:

He is here in the court room.

[284] Q. Mr. Houston, is he here?

A. I think Mr. Houston was present.

Q. Is he here in Christiansburg?

A. Yes, sir.

Q. And Mr. Slayton I know is here because I know him.

A. Yes, sir.

Q. How many of those bolts were in that crown-sheet?

A. I couldn't tell you unless I looked at it.

Q. Don't you know from a boilermaker's experience the number of bolts that are in it?

A. There was twelve rows of button-heads bolts or them crown-bolts.

Q. How many to the row?

A. I don't know exactly; I believe there was about—I couldn't say to be positive about it, right up to the bolt.

Q. There were a thousand or more bolts or 1200 bolts in that crown-sheet, weren't there?

A. I don't think there was that many?

Q. In the whole crown-sheet?

A. No, sir.

Q. How many of those bolts, when you inspected that engine, were broken; what percentage of the bolts were broken; nearly all of them, weren't they?

A. The heads were pulled off of all of them we have; it had gone down?

Q. How hot do you think the sheet was?

[285] A. I couldn't say how hot it was, but it must have been pretty hot.

Q. Doesn't your experience—you are put on here as an expert boilermaker along this line—wouldn't your experience enable you to form an opinion how hot that sheet was when it failed?

A. I couldn't say, but from my judgment it must have been pretty good and red for it to have been that weak, or it had been hot some little time for the bolts to have gotten that weak.

Q. Or it could have been heated before?

A. I don't know as I—

Q. (Interposing.) If it was heated before—

By Mr. Hall:

Wait a minute. Let him finish his answer.

Q. Do you want to say anything more, Mr. Bowden?

A. How was that last question?

Q. I don't know. Read the question to him.

(Question is here read to the witness.)

Q. If you want to answer any more go ahead.

A. What I was going to say, I don't know as that would have had any effect on the bolts if it had been previously heated—on the bolts at this time.

Q. You don't think it would have had any effect on the bolts at all if it had been previously heated?

A. Not their coming off, unless it had been heated again.

[286] Q. What difference would it make in the mark you say is on that bolt, running an inch and a half up, whether that had been hot thirty days before, one day before, a week before or a year before? What difference would it make in the color of that mark that you have told this jury about? It wouldn't make any, would it?

A. Not at the time, if you inspect it right. If it was heated it would show the same temperature or would show the same color.

Q. If you inspected it a year afterwards it would show the same thing?

A. No, sir.

Q. How long afterwards?

A. You can take any piece of iron and heat it and work it and—

Q. (Interposing.) We are not working this; we are just heating it and saving it.

A. That is my experience.

Q. If that piece of iron is kept free from atmospheric exposure, as it is kept in the inside of the boiler, would it make any difference in the color marks whether that heat had been applied there one hour, twenty-four hours or thirty days before?

A. Yes, sir; the color wouldn't stay on the inside of the boiler.

Q. On the inside of the boiler?

A. No, sir.

[287] Q. Why?

A. Because it would have recoated with sediment from the water.

Q. How long does it take to recoat?

A. Not very long.

Q. Give us some idea. That is one question we have been trying to find out in this case, how long?

A. I suppose—that would depend on the conditions of the water altogether.

Q. Now, I am speaking about the water such as the engines and boilers of the Virginian Railway drink, that water?

A. There is times when the water we have there would color it very quick, at least mud would get around it and sediment.

Q. Mud would get around the bolts?

A. And sediment from muddy water.

Q. And that would accumulate on the bolts and aronnd the bolts until the color would be absorbed by the mud, is that your idea?

A. Until it would cover the coloring.

Q. Was there any mud on this, or in that boiler?

A. It didn't show any to any amount, only this coating on all the bolts and on the seats.

Q. There wasn't any mud to bother the color?

A. No, sir; not when I inspected it.

Q. What else would bother it?

A. I don't know anything that would change that color.

Q. You cannot tell me anything else would change the [288] color except mud, and the mud did not change it?

A. It don't look like any mud ever got on it since it was heated.

Q. Now, go back and tell the jury the appearance of that color, whether it would have made any difference, whether it would be on there twenty-four hours or thirty days or a year previous.

A. If the engine runs any after it had been heated that coloring on the bolts would have been covered with sediment.

Q. What kind of sediment?

A. A covering of sediment that is in the water.

Q. What kind?

A. Any kind—mud or lime or anything that gets in the boiler.

Q. Now, I am going to ask you to give this jury some idea how long it would take to deposit mud or lime sediment or whatever you are talking about on this crown-sheet and around the bolts to such an extent as it will change the color of a burned bolt?

A. I do not think it would take more than a few hours to put enough on that, if the engine was in use, for to change or hide the burned or heated color on the bolts.

Q. When mud sediment and stuff will get on it—

A. (Interposing.) It will hide the heated covering of the bolts.

Q. Wouldn't that same sediment and mud check up the little leaks in the boiler?

A. If it is not washed in proper time it finally would, if [289] enough settled on it to do that.

Q. If it will in a few hours cover up a bolt so that you cannot see the color of it or on it, how long would it take to check a small leak around the bolt? Would it take a year to do that?

A. It don't take but very little to hide the coloring of the heat on the bolt.

Q. You just put that on like paint, I suppose. Do you mean to say it would take just a few hours to cover up a bolt so as to change its color and would take a long time to check up a small leak around the bolt by that same sediment? Is that what you tell the jury?

A. I say it won't take long to cover the coloring of a heated bolt on the inside of the boiler if it was in continuous use.

Q. It is a cinch that according to your theory, at least, if that bolt or those burned bolts got into your hands nothing could change the color of them then, could it? I mean after they got into your hands?

A. Nothing.

Q. But the atmospheric conditions of the weather?

A. That is all.

Q. If you kept them out of the weather they would look the same way, wouldn't they?

A. If they were kept or preserved right they would preserve that color.

Q. Can you look at a burn or a piece of iron and tell [290] when it was made?

A. No, sir. You mean tell when the burn was made?

Q. Yes.

A. No, sir. I can tell it was burned; that is what I understood you to say.

Q. No. My question is: can you look at it and tell when it was burned? Can you look at those burned bolts and tell when they were burned?

A. I could tell that they were burned previous to the time that I looked at them.

Q. Of course, or there wouldn't be any burn there. But could you or any living man tell that jury when they were burned?

A. Certainly not.

Q. That is what I have been trying to get at.

A. In an hour or anything of the kind, do you mean?

Q. You don't know when they were burned?

A. No, sir; I couldn't tell the hour it was burned at all.

Q. These bolts an inch and an eighth in diameter and made of this elegant material, with the big button-heads on them, how long would they remain at red heat with 185 pounds pressure in the boiler before they would give way?

A. I couldn't tell you that. They have got to get hot enough to lose strength enough so that 185 pounds of pressure would push them off. No, I couldn't tell you how hot they would have to be to get to that stage.

Q. You can look at that sheet and tell it never was more
[291] than a red heat, can't you?

A. I cannot say that; I cannot say how hot. I know it wasn't hot enough to begin to pit away or fall apart; but I cannot say how hot it was.

Q. It would do that at a white heat, wouldn't it?

A. No, sir.

Q. What heat would do it?

A. It has got to be burning hot, when you get a white heat; if you go much higher then it would begin to burn and drop away.

Q. If it went to a white heat it leaves iron scale on it, doesn't it?

A. Yes; it will leave a scale on it, at any heat; it depends on conditions in heating, has always been my experience. You can heat a piece of iron in a furnace both sides get hot it looks as if it don't scale as much as if you were to expose one side to the air.

Q. What I am trying to get at is, you can look at a piece of iron and tell whether it has ever been to a white heat, can't you?

A. I don't know as I could after it got cool. I can tell it has been heated, but I couldn't tell you just how hot it has been.

Q. Don't it leave a different color if it is heated to a white heat than if it is heated to a red heat?

A. I could not tell you whether it would or not.

[292] Q. Will you look at the off side of this base drum and tell me whether this side was heated and how hot in your judgment was it heated?

A. I will look at it but I won't be able to tell you how hot it was heated. (Witness examines drum.) That has been heated, it shows to me a red heat but there I couldn't tell you how much hotter.

Q. You know it got to a red heat?

A. Yes, sir.

Q. You tell that from this reddish oxidation?

A. Yes, sir.

Q. Will you look and see if there is any on that sheet at all. (Witness examines the sheet.) Did you find any of that red oxidation on the sheet?

A. Not to any extent, it don't show the same color as that.

Q. Was that heated with water in it or out of it?

A. I cannot tell you.

Q. You can heat it with water in it?

A. It may have had water in the drum, you couldn't heat it with the water on that head.

Q. I asked you if there was water in it. There was bound to be on the head if they heated it from underneath.

A. It has two heads.

Q. Did you ever see anything stand on its head and get heated? They don't stand it on its head and heat it from the other side?

A. It can be done.

[293] Q. Are you fixed up in your shops so you can do those stunts?

A. I couldn't tell what position it was in when it was heated, or when it was heated.

Q. If it was heated with this head down, can you tell me whether there was any water in it?

A. If there was any in the drum?

Q. By the law of gravity, if you turn a thing upside down, the water would go to the bottom?

A. It couldn't have been heated from the bottom with water in it.

Q. Didn't you say a moment ago you didn't know whether it could be or not?

A. Yes, sir. I don't know which end was up or what position it was in.

Q. In other words, you cannot tell from the appearance of it whether it was heated with water in it or not, can you?

A. I cannot tell how hot it was; I don't know in what position; if there was water in it. It wasn't heated with water on that head, in my judgment.

Q. Can you tell us, looking at that and assuming it was setting up in the right shape, if it was heated? Can you tell us whether that was heated with water on it or not?

A. Which end down?

Q. That end down (indicating).

A. If it had water in it enough to cover the head it
[294] wasn't heated with water in it, you couldn't heat it with water enough on it.

Q. You state that, do you?

A. Yes, sir. You couldn't heat it with the water standing over that head there sufficiently to keep it covered.

Q. How else could they heat it unless they stood it with that end down?

A. You could heat it with that end down (indicating.)

Q. And built a fire on top of it?

A. Yes, sir; you can do that and heat it as far as that is concerned.

Q. You could?

A. Yes, sir.

Q. You think you could build a fire on that and heat it to a red heat?

A. Yes, sir.

Q. With water in it?

A. Yes, sir; build a fire on top of it, if that was half full of water, or anything like that, and turn it up on the end and build a fire on the top end, it would heat.

Q. You could do it by building a fire on top of it?

A. Yes, sir; on the head the water don't touch.

Defendant objected.

Q. There is no other way they can heat it, is there?

A. There is no way to heat it as long as water stays on
[295] that head; you would have to heat the head the water wasn't against.

Q. How hot can you get a piece of iron with water lying directly on it?

A. Hot enough to boil the water and finally evaporate it.

Q. To what degree of temperature can you get it?

A. I guess about—I don't know.

Q. Don't guess, if you don't know say so.

A. I don't know how many degrees.

Q. You don't know?

A. No, sir.

Q. How hot does it get to boil? You don't know that either, do you?

A. I couldn't tell you how hot a boiler would be if it was fired, how many degrees hot it was.

Q. At what degree of temperature will it begin to make steam?

A. I couldn't answer that.

Q. You are an expert here on the question of heat, and you don't know what the boiling point is?

A. I am a practical boilermaker.

RE-EXAMINATION.

By Mr. Hall:

Q. You were asked several questions about engine 473 and you stated that that engine was scorched, the crown-sheet of it was. Did that crown-sheet blow down and did the engine fail?

[296] A. No, sir.

Q. To what extent was the crown-sheet of engine 473 scorched?

A. It was scorched enough to make the bolts leak, two or three of the bolts seemed to be a little bit loose in the holes, so they were leaking very bad.

Q. How many bolts leaked and how many bolts were replaced when it was repaired?

A. I think, as well as I remember, we put in six bolts in it, but I won't be positive about that.

Q. Do you know where that scorching took place?

A. Yes, sir.

Q. Where?

A. It was a little wide of the center.

Q. I don't mean in the crown-sheet, but at what point was it, in Princeton yard, or do you not know?

A. No, sir; I couldn't tell you where it taken place, whether it was there or not; but that is where we located it.

Q. How did you locate it?

A. The night boilermaker. He reported it to me the next morning.

Q. How did it show—what indication was there of the fact that it was scorched there?

A. It just showed that the bolts was leaking a little and the sheet showed a little scaly, whenever you heat it it begins to break that soot scale loose that forms on the sheet on the inside, and

[297] that was broken loose and the bolts was leaking, and there was a little discoloring of the iron.

Q. You were asked whether the sediment that is in the water and the deposits on the inside of the crown-sheet, whether that will

stop leaks in the stay-bolts. If it has been burned and the holes opened, will that sediment fill up the holes in the stay-bolts, I mean the openings in the stay-bolt holes through which the leak comes, and stop it?

A. No, sir; that wouldn't stop the leak, the sediment wouldn't.

(Witness stands aside.)

Court adjourns until tomorrow morning, October 8, 1914, 9:30 a. m.

[312] (Manuscript page 313 marked out.)

[314] JOHN SCHAEFER.

John Schaefer, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Wingfield:

Q. What is your occupation?

A. At the present time?

Q. Yes.

A. I am a machinist in the erecting shop.

Q. Of what company?

A. The Baldwin Locomotive Works.

Q. How long have you been employed by the Baldwin Locomotive Works?

A. Fourteen years.

Q. During that time what occupation have you followed?

A. I followed the machinist's line and I followed boiler inspection and tests.

Q. Did you make any test of this engine 469 that was built for the Virginian Railway?

A. I made a test on our shop number 12461/4 E 28.

Q. Does your record show the Virginian Railway number of that engine?

A. No, it does not; not in the record here, it just shows the shop number.

Q. On what date did you make that test?

A. 4-17, 1912.

Q. That is April the 17th, 1912?

A. Yes, sir.

Q. Tell the jury what test you made of that engine.

[315] Q. Did you state when you made the test?

April 17, 1912.

Q. Tell the jury what test you made of that engine?

A. We put 267 pounds to the square inch, water pressure, on this boiler, after all the flues were put in and were thoroughly cleaned on the inside and the mud ring was scraped out.

Q. How long did you let that 267 pounds to the square inch remain on the boiler?

A. About four hours.

Q. What was the result of that test, how did the engine show up?

A. I have it here in the book, shall I read it?

Q. I want to know how the test showed up, whether it showed a good boiler, or a poor boiler?

A. It showed a good boiler.

Q. Tell the jury exactly what the record of that test is?

[316] A. Tightened all wash-out plugs before fire, tightened auxilliary dome before fire; replaced two caps right side of crown before fire; replaced one bushing on crown; watched two crown bar bolts; tightened stud before fire; tightened sand box before fire.

Q. You say that indicates that was a good boiler?

A. Yes, sir.

Q. After this test was over, what did you do with the engine?

A. I left the report for my night man and he made replacements before fire, and put the fire test on.

Q. Who was your night man?

A. James Reed.

Q. Then after the fire test had been made did you make any further test of this engine or run the engine?

A. I kept the record of all the engines and after the fire test was made and the replacements were made and the engine was gotten ready to blow her cylinders out, we run pressure, filled it up to the regular test and watched the boiler on the replacements we had already made, and if it shows anything then we put them on, or we make the replacements again, and then the engine goes on the yard for the running test.

Q. How did it show up under this test that you have just mentioned?

A. We made no record of the running test or on the blow-out test.

Q. It showed no defects then?

[317] A. No, sir.

Q. Did you make the running test you have spoken of?

A. No, sir. What I mean by running test, I stayed out in the yard while the engine is running, and see if anything breaks out on the boiler and see that the safety valves go off at the proper time.

Q. Did you see that done?

A. Yes, sir.

Q. How did the engine show up under that test?

A. Fine.

Q. You said that two of the stay-bolts showed leaks? What was done with those stay-bolts?

A. Two stay-bolts showed a leak? They were not stay-bolts, they were crown-bolts.

Q. Crown-bolts, I mean.

A. We fixed them up to hold fire and took them out after the fire.

Q. How did she show up then?

A. After we put that second fire on, on the blow-out, they did not show up at all, that showed up fine.

CROSS-EXAMINATION.

By Mr. Hunt.

Q. Your name is Mr. Schaefer?

A. Yes, sir.

Q. Your Company never sent out for delivery a bad engine since you have been with it, has it?

A. No, sir.

[318] Q. It never did?

A. No, sir.

Q. While hundreds have gone down, haven't they?

A. That doesn't say that the Baldwin people sent them out bad though.

(Witness stands aside.)

[319] JAMES REED.

James Reed, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Wingfield:

Q. What is your occupation?

A. My occupation is air brake inspector now.

Q. For the Baldwin Locomotive Works?

A. Yes, sir.

Q. How long have you been employed by that company?

A. Twelve years.

Q. What has been your employment during that time?

A. First as a machinist, from there to boilermaker, and boiler inspecting.

Q. What was your occupation in April, 1912?

A. Boiler inspector.

Q. Did you inspect engines that we have been talking about?

A. Yes, sir.

Q. Your shop number 12461/4 E 28?

A. Yes, sir.

Q. Tell the jury what inspection you made of that engine?

A. I made a fire inspection of the boiler.

Q. Was the engine complete at that time?

A. The engine was completed, the boiler was completed in the engine.

Q. What test did you make? Describe the test to the jury.

A. A fire test, after the water test is made on the boiler.

[320] Q. That was the test that has just been told about by Mr. Schaefer?

A. Yes, sir; that was in the daytime. I came in at night time to replace the work necessary to be done, or reported to be done, and then we turned around and fired the boiler up. We also opened before that time the dome and we go in and take the throttle out and go out and inspect the crown-sheet to see that there is nothing on the crown and that everything is O. K. Then we put the throttle in again and close the boiler up and put water to two guages, then we fire the boiler up to the steam test of 220 pounds, then we go all over the boiler and see that there is no defect, and see about the few replacements that have been put on her.

Q. Did you do that with this engine?

A. Yes, sir.

Q. And how did it show up under that test?

A. First-class.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. You say you boiled it out in soda?

A. We blow the cylinders out, blow the dirt out of the cylinders.

Q. You blow the dirt out of the cylinders?

A. Yes, sir.

Q. Didn't you boil your crown-sheet with soda?

A. Yes, sir.

Q. That is after the engine is constructed, isn't it?

[321] A. No, sir; whenever we put that throttle in and fill that boiler with water for the fire test, we put soda in then, and the soda is in then, and after that we leave the water all out and also test it again and wash the boiler out thoroughly, the mud rings and all.

Q. That is after the boiler has been completed?

A. Yes, sir.

Q. That is when your stay-bolts are all in?

A. Yes, sir.

Q. The stay-bolts are in about four inches apart all over the entire crown-sheet, are they not?

A. Yes, sir; four inches apart.

Q. That crown-sheet is how long?

A. There are different sizes.

Q. The crown-sheet of this engine, I mean.

A. I couldn't just say how long the crown-sheet is.

Q. How wide was it?

A. I couldn't say just how wide it was.

Q. There is a thing that you call a wagon top over the crown-sheet?

A. Some boilers have that.

Q. Did this one have it or not?

A. A wagon top style, there is two or three different styles for the wagon.

[322] Q. I don't care about the styles, whether it was a buck-board or what it was. Did you have what you call or what boilermakers call a wagon top over the crown-sheet?

A. I don't know whether I could say that or not.

Q. How would you hold the steam in there if you did not have that wagon top over it?

A. We had the shell of the boiler over it.

Q. You had the thing over the crown-sheet that these stay-bolts were fixed in?

A. Yes, sir; that is the shell of the boiler.

Q. Is that what some of them call the wagon top?

A. I don't know whether they call it a wagon top or not.

Q. But you had that shell on that, you speak of?

A. Yes, sir.

Q. When you went into it, didn't you?

A. Yes, sir.

Q. Is it possible for any living man to go in that boiler between the crown-sheet and the shell after your stay-bolts are put in, without pulling down the sides of the boiler?

A. You don't go on top of the crown, we go in the boiler, but not on top of the crown; you take a light and look on top of the crown.

Q. Do you mean that you go under the sheet?

A. No, sir; you go inside the boiler.

Q. How do you get in it?

[323] A. By the dome.

Q. It is not possible for any man to get in there, is it?

A. Yes, sir.

Q. Go in through the four-inch stay-bolts?

A. No, sir; he don't have to go through those four inches.

Q. The stays are put in there over four inches apart?

A. Yes, sir.

Q. A man has got to goin between those or take them out of the way if he goes inside of that boiler, hasn't he?

A. No, sir.

Q. What is he, a snake, can he crawl around in there?

A. You go in the boiler, you do not go on top of the crown-sheet, you go in the boiler, you stay outside the crown-sheet and you have a light and look all over it.

Q. You mean you send a light in instead of going in?

A. You can see all over the crown with your light.

Q. It is not possible for a man to go in there, is it?

A. In the boiler?

Q. Yes.

A. Yes, sir.

Q. When those stay-bolts are sticking up that way?

A. You don't go in the stay-bolts, you go in the boiler.

Q. Do you go over the crown?

A. You do not go over the crown, you can stand outside

[324] with a light and look over the crown.

Q. Physically, he cannot go in there?

A. He can go in the boiler.

Q. I said over the crown?

A. Not over the crown?

Q. If he goes in the boiler he goes in the dome, doesn't he?

A. Yes, sir.

Q. And that does not let him down below what you call the

shell, does it?

A. That is not on top of the crown; the dome is on the boiler, you go in the boiler and go back to the crown.

Q. The boiler is the whole thing and that includes the flue sheet, the flues, crown-sheet or shell, and the whole thing, doesn't it?

A. Yes, sir.

Q. And the space wherein the steam is held is completely inclosed with solid steel, isn't it?

A. Yes, sir.

Q. It is bound to be or else you couldn't move a wheel of the engine, the steam would go off in the air, wouldn't it, that is true, isn't it?

A. The steam would go up in the air? No, sir.

Q. If you didn't have anything there to encase it and enclose it, why wouldn't it?

A. The shell—there has got to be an open space for the steam.

Q. The shell does encase it?

[325] A. Yes, sir.

Q. You understand my question; it is not a hard question. If you do not have an encasement or an enclosure which you call a shell, and it has been spoken of here as a wagon top, on the top of it and a crown-sheet under the bottom, that is the enclosure wherein the steam is generated and confined, isn't it?

A. Yes, sir.

Q. If that was not solidly enclosed with a heavy steel casing or a wrought iron casing, the steam would escape and go in the air, wouldn't it?

A. Yes, sir.

Q. Now, then, is it possible for a man to go inside of the boiler between the crown-sheet and your shell?

A. Not between the crown-sheet and shell.

Q. He couldn't any more do that than he could fly, could he?

A. No, sir.

Q. The only part of the boiler that he could get in would be behind that, wouldn't it?

A. No, in front of it.

Q. Over the fire box?

A. No, sir.

Q. In front of it, where then?

A. You go down into the dome at the barrel of the boiler.

Q. What is the dome? Tell me.

[326] A. The dome sets on the top of the barrel of the boiler, where the throttle sets in.

Q. What is a dome?

A. A dome—that looks something like it on top of an engine (indicating the drum heretofore spoken of).

Q. I am glad you have told me what that thing is, I have been trying to figure out what it is, is that a dome?

A. I don't know.

Q. You don't know what it is? You don't know whether it is a dome?

A. I don't know what that is.

Q. I thought maybe you could throw some light on it; nobody else has. Now, what is a dome?

A. It is an extension of the boiler, it is the dome of the boiler that the throttle sets in.

Q. Is it on top, on the side or rear or where?

A. On top of the barrel.

Q. Where is the barrel?

A. The barrel is on top of the fire box.

Q. Is the barrel the place where the flues run back through?

A. Yes, sir.

Q. Then your dome lets you down in on the flues?

A. Yes, sir.

Q. But it don't let you in between the crown-sheet and the wagon top?

A. No, sir.

Q. How far is the dome situated behind the fire box?

[327] A. It sets in front of the fire box.

Q. When you speak of the front of the engine you mean the engine next to the pilot?

A. No, sir; nearest to the front of the engine, nearest to the smoke stack.

Q. Is it next to the engineer or next to the pilot, the cow-catcher?

A. It is next to the pilot.

Q. Or cow-catcher?

A. Yes, sir; that is the front of the engine.

Q. Then that dome is in front of the fire box and in front of this crown-sheet?

A. Yes, sir.

Q. And over the flues that run back in through the flue sheet?

A. Yes, sir.

Q. Now, when you are back in the dome of your engine with your shell complete, with your flue sheet complete, can you see into the crown-sheet or where the crown-sheet is?

A. Between the crown-sheet and the shell, you can.

Q. How?

A. You are over the top of the flue sheet, you don't go in between this, you go over the top there, and then you are in between the shell and the flues.

Q. You don't get down where the flues are?

[328] A. No, sir; you go on top of the flues.

Q. How big a space is that there?

A. It is big enough for a man to pull himself through any way.

Q. Big enough for a man to pull himself through?

A. Yes, sir.

Q. Is that the place where the steam goes to the machinery of the engine?

A. Yes, sir.

Q. That is the space through which the steam goes to the machinery of the engine?

A. Yes, sir.

Q. Now, when you are up over the flues, under the dome, how far are you from the rear of the engine where the fireman and engineer stays?

A. You are right in front of the crown-sheet.

Q. Please give it to me in feet, how far you would be between the rear of the engine and I mean by the rear, now adopting your terms, as the place where the engineer stays in the driving of his engine how far are you from the rear of that boiler?

A. Just as long as the crown-sheet is, you are up at one end of the crown-sheet.

Q. Do you know how long the crown-sheet was in these engines?

A. No, sir.

Q. Haven't you got any idea?

[329] A. No, sir.

Q. Wasn't it several feet?

A. It was several feet; yes, sir.

Q. Then between you and the rear part of that boiler wherein is located these radial stays running up every four inches apart and just as thick as radial stays are in the head of this thing, aren't they?

A. Yes, sir.

Q. The same distance all the way through that boiler?

A. Yes, sir.

Q. How do you get in there to clean it out?

A. We put soda in there and that takes the dirt and everything off and washes it down to the bottom of the boiler, and then we take the hose to make sure that it is all washed and put it in there and open the wash-out plugs and wash all that crown off and everything down to the mud rings. Then we take hooks and clean the mud rings out, if there is any scale or oil or anything like that, and put a hose under the bottom and see that that is thoroughly washed.

Q. You do find these scrapings and filings in there?

A. Once in a while we run across a little bit of it that goes in amongst the grease.

Q. It is pretty hard to get that out, is it not?

A. No, sir; that soda will boil all that out and wash it out to the bottom.

Q. It won't wash the iron?

A. We take our light and look and see if there is any-
[330] thing on there as big as that (indicating).

Q. You do not expect to get that from the soda process?

A. If we see it we get it out.

Q. And if you don't see it you don't get it out?

A. That is what we are there for.

Q. Do you mean to say that your company has not sent out engines in that shape?

A. Not of my inspection.

Q. How about 473?

A. I know nothing about that.

Q. That is one that didn't come under your inspection?

A. I know nothing about that. I only speak of the engines I passed.

Q. I wish I knew your shop number for 473; you haven't got any idea what that is, have you?

A. No, sir; these ten engines is what I was on.

Q. How many batches of engines did you inspect for the Virginian?

A. In different years I inspected quite a number.

Q. Different batches for the Virginian?

A. Yes, sir.

Q. Haven't you inspected all of the engines that the Virginian Railway Company got from the Baldwin Locomotive Works?

A. I cannot say all; I inspected some of them.

(Witness stands aside.)

[332] A. M. McGHEE.

A. H. McGhee, sworn, for defendant.

DIRECT EXAMINATION.

By Mr. Hall:

Q. What line of work do you follow?

A. Boilermaker for the Virginian?

Q. How long have you been a boilermaker?

A. Twelve years now.

Q. How long have you worked for the Virginian?

A. Four years the 28th of last August.

Q. Were you working for the Virginian at Princeton on November the 11th, 1912?

A. Yes, sir.

Q. Did you make a Government monthly inspection of engine 469 on November the 11th, 1912?

A. Yes, sir.

Q. Is that one of the original copies of your report to the Government of that inspection?

A. Yes, sir.

Q. I wish you would tell the jury whether you inspected this crown-sheet or not.

A. No, sir; I did not.

Q. What part of the engine did you inspect?

A. I witnessed the guage test and the pop, setting of the pop and tried both injectors, and the water cocks and the guage cock.

Q. Were they all right?

A. Yes, sir; in good condition.

Q. Please state what condition the two injectors were in [333] on that engine on November the 11th, 1912?

A. They were in good condition, they worked nicely, both of them.

Q. Did you try both of them?

A. Yes, sir.

Q. You have had experience in inspecting and testing injectors, have you?

A. Yes, sir; I have been working on that for twelve years, you may say; I made that my business. I was inspector for the Virginian

people at the time and I went over all that stuff; I had instructions to go over it and I went over it.

Q. What condition did you find the water glass in?

A. It was open and clear.

Q. Did you inspect the guage cocks?

A. Yes, sir.

Q. What are they for, what is the use of them on the engine?

A. To tell where your water is at and how much you have got in it.

Q. You mean how much water you have got in the boiler?

A. Yes, sir.

Q. What condition were they in?

A. They were open and in good condition.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. This report is signed, A. H. McGhee, Inspector, and went to the Government of the United States?

A. Yes, sir.

[334] Q. Did you ever send one of these reports to the Government that did not show the engine was in good condition, in your life?

A. Yes, sir.

Q. Did it show that the engine was in bad condition?

A. No, sir.

Q. I asked you did you ever send in one that did not show a good condition?

A. If there was anything bad about it I would have it fixed.

Q. Before you let your report go into the Government?

A. Yes, sir.

Q. I will change the form of the question. Did you make a report on engine 473 just before its crown-sheet had trouble?

Defendant objected. Overruled. Exception.

A. When 473 came in there, the night man, he got the engine and then it went to the back shop and I inspected it there, but I do not know the date.

[335] Q. You still haven't answered my question. I asked you if you made a report of engine 473 just before, not after this trouble, but before it had trouble with its crown-sheet, the same kind of a report that you sent in one 469?

A. Yes, sir.

Q. You reported that in good fix, didn't you?

A. Yes, sir.

Q. When as a matter of fact there was stuff on the crown-sheet, wasn't there?

A. Let me understand you.

Q. After you made this report on engine 473, after you made the report it developed that there was stuff, filings and scrapings, etc., on the crown-sheet of engine 473, wasn't there?

A. Yes, sir.

Q. While its crown-sheet was in that condition, your report was in with the Government showing everything O. K., wasn't it?

A. Yes, sir; I think it was. I inspected it.

Q. Did you have Mr. Massie's report when you inspected engine 469, the offending engine in this case, on November the 11th, 1912, and by Mr. Massie, I mean the engineer who had run it on the trip just before that?

A. No, sir.

[336] Q. I will ask you, did you ever see the work report turned in by Engineer Massie with reference to this particular engine, 469, turned in on the 10th day of November, 1912, the day or day before you made this inspection?

A. No, sir.

Q. You did not see that?

A. No, sir.

RE-EXAMINATION.

By Mr. Hall:

Q. Do you know whether you had inspected engine 473 before those leaks developed around the crown bolts?

A. Yes, sir; I think I had been over it, I am sure I had.

Q. Do you know when that engine arrived?

A. No, sir; I haven't the date, I did have it.

[337] Q. Do you inspect those engines at any time except when you make the monthly Government inspection?

A. Yes, sir; when I was inspector there in the day time, I would make a careful examination. I went in and looked at it. I wouldn't go over all of the holes and stuff like that, but I would see that everything was in good shape.

Q. Do you know whether you had made a Government report

on engine 473, or a Government inspection and Government report on engine 473 before these leaks developed?

A. I couldn't say positively; no, sir.

By Mr. Hunt:

He did say he had.

By Mr. Hall:

I do not think he understood the question and that is why I asked him over again.

RE-CROSS EXAMINATION.

By Mr. Staples:

Q. You said a few minutes ago you did make it?

A. I did not say positively, I said I thought I had, but I do not know positively that I had.

Q. You did not say before anything about thinking about it?

A. No, sir; I said I think I had, but I did not say positively.

By Mr. Staples:

Please go back there and read his evidence.

(The evidence referred to is here read by the stenographer.)

(Witness stands aside.)

[338] A. S. FUNK.

A. S. Funk, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. What is your work?

A. Boilermaker.

Q. How long have you been a boilermaker?

A. Eight years.

Q. Were you employed by the Virginian?

A. Yes, sir.

Q. How long have you been employed by the Virginian?

A. I have been employed by the Virginian four different times, the last time I have been employed about four months, or a little over three months, close to four.

Q. Are you the A. S. Funk who made this Government report of the inspection of 469 on November the 11th, 1912?

A. Yes, sir.

Q. What part of the engine did you inspect?

A. The stay-bolts of the crown-sheet, and I seen the water glass and guage cocks were cleaned out; looked through the arch pipe and saw the plug.

Q. Tell us what condition you found the stay-bolts and crown-sheet in?

A. First-class condition.

Q. What inspection did you make of them?

A. I went over all the stay-bolts with a hammer to see if I could find any broken bolts or to see if anything was wrong with it in any way.

Q. If there had been anything wrong with the stay-bolts [339] would your inspection have shown that?

A. Yes, sir.

Q. What inspection did you make of the crown-sheet?

A. I went over the bolts and looked at the crown-sheet to see if I could see anything wrong with it.

Q. Was the crown-sheet pocketed or did it show any signs of being burned at that time?

A. No, sir.

Q. If it had been burned or pockets in it as you see that crown-sheet there now, would you have been able to see them?

A. Yes, sir.

Q. What condition did you find the water glass in?

A. We took the water glass off and cleaned it out, we run a piece of steel wire through it to see if there was any mud in it, and we did the guage cock the same way.

Q. What is that for?

A. If there is anything in there to knock it out.

Q. Did you test them afterwards?

A. No, sir; I left it for Mr. McGhee; I get off at 4:30 in the morning.

Q. And he made a test of those?

A. Yes, sir.

Q. You did not test the injectors?

A. No, sir.

CROSS-EXAMINATION.

By Mr. Staples:

Q. Where did you start being a boilermaker?

[340] A. The first I was a boilermaker, I worked in Cape Charles, Virginia, for the N. Y. P. & N. Railroad.

Q. How long did you work there?

A. Eight months.

Q. What was your position there?

A. Boilermaker; that is the first time that I got boilermaker's pay, that is where I first worked at.

Q. Did you ever go through an apprenticeship?

A. I served some apprenticeship and helped.

Q. Where at?

A. The Roanoke Machine Shops and in Cleveland, Ohio.

Q. How much did you serve?

A. Not much, but I started helping again and got a job as a boilermaker.

Q. Isn't it true that pretty nearly all of the boilermaking that you have been at was done helping or just a helper?

A. No, sir; I have been a boilermaker for eight years.

Q. You got to be a boilermaker but you never did get your trade?

A. Yes, sir; I can do boiler work.

Q. But you never made your apprenticeship?

A. I never served all my time.

Q. How much time did you serve?

A. I helped a good while, I did lots of that, but I never served all my time. I do not pretend to be as good as some of them, but I can do that work. I do not claim to be an expert, I claim to

[341] be an ordinary boilermaker and can do ordinary boiler work.

Q. You are not a a machinist either, are you?

A. No, sir.

Q. And yet you are doing the very most delicate work of the kind that is required around a boiler, that is inspecting stay-bolts?

A. No, sir; that is a boilermaker's work and not a machinist's work.

Q. You inspect them?

A. Yes, sir.

Q. How do you inspect them?

A. I take a hammer and hit every one and you can tell by the sounds and by the vibration of the sheet and the way the hammer bounces, etc.

Q. It requires a lot of experience to do that, does it not?

A. I have done a lot of it.

Q. Where did you start doing that?

A. I inspected some for the Norfolk & Western and some for the Seaboard Air Line.

Q. When did you inspect for the Norfolk & Western?

A. I don't know exactly the date, but whenever the night inspector would be off I would take his job, I didn't have a regular inspector's job.

Q. Not for the Norfolk & Western?

A. I would assist, and when the assistant was off, I inspected them.

Q. Did you ever sign an inspector's report for the Nor-
[342] folk & Western?

A. I believe when I inspected them it was before that Government report came out.

Q. You never did sign any report that you know of, of an inspection of a boiler for the Norfolk & Western?

A. I never signed any Government inspection report, but I signed the boiler inspection.

Q. When did you sign a report for the Norfolk & Western now?

A. I cannot give you the date?

Q. What year was it?

A. I worked for the Norfolk & Western about four times in Bluefield, but I cannot say the exact date.

Q. Did you work at Roanoke?

A. Yes, sir.

Q. Where did you work last?

A. I worked at the West End, Roanoke, as a boilermaker, and in East End as a helper.

Q. When did you work in Roanoke last?

A. West Roanoke.

Q. What was your employment there?

A. Boilermaker.

Q. What pay did you get?

A. I think they were paying 34½ cents an hour.

Q. Who were you under?

A. Mr. Laughorn was the boss and Mr. Doarnberger was
[343] the master boilermaker.

Q. Mr. Doarnberger is stationed at East Roanoke?

A. He is foreman of the shop at the East End.

Q. And you were at the West End?

A. Yes, sir; Mr. Laughorn was at the West End.

Q. You never did any boiler work under Mr. Doarnberger, did you?

A. No, sir; only helped.

Q. What kind of an inspection did you make of that engine, 469?

A. I went over the stay-bolts, crown-bolts, and seen that the water glass was cleaned out, the machinist did that, and I stood there and looked to see that he done it, because I had to swear to it. That is a machinist's work to do that and not my work.

Q. You swear you did it although the machinist actually did it?

A. The machinist did it and I watched it because I had to swear to it, that is machinist's work and not my work.

Q. Did you go inside the engine?

A. I went in the fire box, I did not take the dome cap off.

Q. Did you go in the boiler?

A. Not where the flues are; I went in the fire box.

Q. You did not look inside the boiler?

A. I did not take the dome cap off.

[344] Q. Have you ever done that to that engine?

A. No, sir; I never have.

Q. Who did do it to that engine?

A. I can't say.

Q. Did you inspect engine No. 473?

A. No, sir.

Q. You never did inspect that engine?

A. No, sir; I worked on the engine but I never inspected it.

Q. Who did inspect it?

A. I don't know.

Q. There didn't anybody inspect that engine at all, did they?

Defendant objected. Question withdrawn.

A. I don't know about that.

By Mr. Staples:

We withdrew the question and answer.

By the Court:

The question and answer are withdrawn, gentlemen of the jury.

Q. You don't know who did inspect it?

A. I don't know who went over the stay-bolts and gave it an inspection like I gave 469, I don't know who did it.

Q. You never inspected engine 473 before it had that boiler trouble?

A. Not as I know of, if I did I don't know it.

Q. What did you find in there when you worked in there?

A. I found the crown bolts leaking; I did not work on it; I went in and seen it was leaking and reported it.

Q. What was the matter?

[345] A. The crown bolts were leaking.

Q. What caused it?

A. The scale or something; I just heard it; I don't know anything about it.

Q. What was it, scale or anything?

A. I don't know; I never seen it; I couldn't tell you.

Q. You say you examined up there for pocketing?

A. I never said that engine.

Q. 469, I mean.

A. I examined it for everything.

Q. You did not inspect it after November the 12th?

A. I inspected it November the 11th.

Q. You did not inspect it after the hostler had it all day on November the 11th?

A. I looked at it when it came to Bluefield, I mean Princeton.

Q. Who brought it in?

A. I cannot say; but after the explosion I looked in there, but that was after the explosion.

Q. You never made any examination to see whether the hostler burned it on the yard?

A. I wasn't down there, I was in Princeton.

(Witness stands aside.)

[346] W. J. PHARR.

W. J. Pharr, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. Where were you employed on November the 14th, 1912?

A. Roanoke, for the Virginian.

Q. What were you doing there at that time, what was the general line of your work?

A. Working there as a machinist.

Q. As a machinist?

A. Yes, sir.

Q. When Mr. A. W. Andrews brought in engine 469 on the morning of the 14th of November, 1912, did he make a work report of that engine?

A. Yes, sir.

Q. Did you take charge of that report and do the work that it called for?

A. Yes, sir; Mr. Kelly and myself did.

Q. Was Mr. Andrew's signature to that report?

A. Yes, sir.

Q. You know his signature?

A. I think I do.

Q. What became of that original work report?

A. I don't know.

Q. Did you not file it as a part of your evidence in the trial of the case in court at Roanoke?

[347] A. I suppose the foreman must have done that, we signed it and put it back in the box, and the foreman signed it, and we signed it after the work was done.

Q. You did not understand my question, you were on the witness stand when this case was tried in Roanoke, were you not?

A. Yes, sir.

Q. Isn't it a fact that the original with Mr. Andrews' signature to it was shown to you there and you identified his signature and filed the report as part of your evidence?

A. Yes, sir.

Q. I wish you would look at this copy of the report and state whether that is a copy of the report that you filed with your evidence in Roanoke?

A. Yes, sir; that is it.

Q. You say that is a copy?

A. Yes, sir.

[348] The Virginian Railway Company.

Form 629.

Report of condition of Engine No. 469 after careful inspection on arrival at Roanoke, 9:40 a. m., 11-14-1912.

Engine in good condition with the following exceptions:

Tighten L Wrist Pin, stop leaks to steam Ram R side.
Train Pipe Pressure.....
Main Drum Pressure..... Does this engine throw fire..No...
Safety Valve Lifts at..O. K...
Safety Valve Seats at.....

ANDREWS, Engineman.

Note: Enginemen must carefully inspect their engines after each trip, and report their condition on this form whether needing repairs or not. They will be held responsible for defect not reported. No attention will be given to verbal reports or reports not signed by Enginemen.

(Reverse Side.)

Repaired at Roke on 11-14, 1912.

The following repairs were made to this engine:

No. 469. Inspected and Repaired, R. Steam Ram Tightened, L. Wrist Pin Nut. Opened Sand.

PHARR & KELLEY.

Inspected ash pan and front end.

KIMMERLING.

Repairs Made By .....
(Name of Workingman in Charge.)
Approved By C. B. D. .....
(Foreman, Roundhouse.)

Note: Workman in charge of the work will sign for the repairs done. Foreman of Roundhouse will approve and forward to the Master Mechanic..

Mr. Hall, continuing direct examination:

Q. Did you and Mr. Kelly make these repairs which are shown on this report and that you show on the back were made?

A. We certainly did.

[349] Q. One thing, it says on here, "Tightened L. Wrist Pin," I suppose that means the left wrist pin. What is a wrist pin and what did you do to it?

A. We tightened the nut on it. It holds the front end of the main rod into the cross-head and sometimes the nut works loose against the key. There is a key that goes through the end of the

wrist pin and they sometimes get loose and we tighten them up.

Q. That had nothing to do with the crown-sheet or injectors?

A. Not a thing.

Q. Or the water glass or the water cocks?

A. Nothing at all.

Q. The next thing reported there is "Stop leak to Steam Ram R side." What was that?

A. That is the steam valve that admits the steam to the injector and when you put your injector on you open that valve and it leaks but it does not hurt the injector, it only obstructs the view of the engineer and we stopped all of that and all other steam leaks.

Q. It prevents his view along the track in front of him?

[350] A. Yes, sir; but it does not have anything to do with the injector at all. What little steam would leak there wouldn't affect the injector at all.

Q. What did you do to that?

A. We put some asbestos packing in it and screwed the nut up on it.

No cross-examination.

(Witness stands aside.)

[351] W. R. MOORE.

W. R. Moore, sworn for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. In November, 1912, what work were you doing for the Virginian Railway?

A. Roundhouse clerk.

Q. Where?

A. Princeton.

Q. Were you acquainted with Mr. Andrews' signature?

A. Yes, sir.

Q. I show you a report of engine 469 and I wish you would please look at that and state to the jury whether or not it is in his handwriting and signed by him?

A. Yes, sir; it is all his handwriting.

By the Court:

What date is that?

By Mr. Hall:

The 13th of November.

By Mr. Hall:

I desire now to offer this in evidence and to read it.

"Report of Engine 469, 11-13-12.

Tighten Knuckle Pin, R (Right) Front, Renew Side Rod Bushing to Driver No. 2 Right Side, set up Wedges, overhaul lubricators to Air Reverser."

No cross-examination.

(Witness stands aside.)

[352] J. A. WHITESELL.

J. A. Whitesell, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. Where were you employed and in what capacity on November the 14th, 1911?

A. Roanoke, Virginia.

Q. Did Mr. Andrews bring in engine No. 469 to the Roanoke roundhouse on the morning of November 14th, 1911?

A. Yes, sir.

Q. Did you take charge of that engine when he brought it in?

A. Yes, sir.

Q. Did you make any test of the injectors?

A. Yes, sir.

Q. How did you find them?

A. All O. K.

Q. Did you examine the guage cocks?

A. Yes, sir.

Q. How was that?

A. Opened.

Q. Did you examine the water glass?

A. Yes, sir.

Q. How did you find that?

A. Open.

Q. What did you do with that engine?

A. I coaled it and sand it and put it on the pit and the fire knocker cleaned the fire and when it came off the pit I put it in the roundhouse.

Q. Was it in the roundhouse all day?

[353] A. Yes, sir.

Q. Did you make any inspection or examination of the crown-sheet when that engine was brought in?

A. Yes, sir; I did.

Q. What condition was it in?

A. O. K. as far as I could see.

Q. Were there any pockets or places in it, sagging down as that crown-sheet over there shows now?

A. No, sir; not as I could see; I didn't see anything like that.

Q. Did the engine have water in it all day?

A. Yes, sir.

Q. What did you do with it?

A. I coaled it and sand it.

Q. I mean at the end of your day's work who took charge of it?

A. Mr. Henry Neece.

Q. Did he come on duty when you went off?

A. Yes, sir; he was at the passenger station with an engine when I went off.

Q. Was the crown-sheet of the engine all right when you turned it over to Mr. Neece?

A. Yes, sir.

Q. Was there water in the boiler?

A. Yes, sir.

CROSS-EXAMINATION.

By Mr. Staples:

Q. How many engines did you handle that day?

A. Indeed I don't know; I expect about seven or eight.

Q. Did you handle all of them at the same time?

A. No, sir; but all the same day.

Q. They were all there all day or most of them?

A. Most all day; of course some of them went out.

[354] Q. And part of the day you were handling all of these engines at one time?

A. Yes, sir.

Q. And all of them had fire in them?

A. Yes, sir.

Q. And you had to try to keep watch on seven or eight engines?

A. No, sir; I didn't do anything like that; I didn't attend to the fire and water.

Q. Didn't you keep watch over them?

A. I filled the cups. I went over that, and they had a regular fire and water man.

Q. Who was the fire and water man?

A. Monk Vaughan; he works for the Norfolk & Western.

Q. He works now for the Norfolk & Western?

A. I think so; if he has not quit.

Q. How did he happen to quit the Virginian?

A. He just wanted more money, I suppose.

Q. You don't know, then, why he quit?

A. No, sir.

Q. He has quit?

[355] A. He didn't get fired.

Q. How do you know he didn't?

A. I know he didn't.

Q. I never said anything about his getting fired, did I?

A. No; you said he kept the fire.

Q. Yes, sir; I said that. And you say he attended to that engine as far as the fire and water was concerned?

A. Yes, sir; I did.

Q. You said you coaled it and sand it and put it on the pit?

A. For the fire knocker to cool it.

Q. You mean to knock the fire out of the fire box?

A. To clean the fire, and he left fire in the fire box; he knocks the clinkers out and the dirt and ashes, and left fire in there; I built the fire up afterward.

Q. And you put some more coal in there?

A. Yes, sir.

Q And shoved it in the roundhouse and let it set there?

A. I put the engine in the roundhouse and turned it over to the fire and water man.

Q. Whether or not that engine got burned in there, you don't know?

A. No, sir; it didn't get burned in there.

Q. How do you know?

A. I know.

Q. Tell the jury how you know it didn't get burned.

[356] A. Because it was kept full of water all day long.

Q. How do you know it was?

A. I was at the engine different times; it is the hostler's place not to sit down when the engine is in there; it is his duty to go over those engines and see if they are all right.

Q. I know that is his duty, but the question is, whether he does it?

A. I did it.

Q. You think you did it?

A. I don't think anything about it, I know.

Q. Didn't you just now say that Mr. Monk Vaughan attended to that end of it?

A. I said he attended to fire and water.

Q. You didn't have anything to do with the fire and water, and you did not watch that at all?

A. I didn't watch that at all.

Q. How do you know that there did not get low water in that engine?

A. I went over there several times that day and looked after that to see that water was in them.

Q. You say you did not watch them, isn't that watching them?

A. It is the hostler's place to look over those engines every now and then to see if they are all right.

Q. Aren't you the man who testified in the Federal Court before?

A. No, sir.

Q. You did not testify before?

A. No, sir.

Q. Didn't you say down there before that there had been [357] a whole lot of complaints of engines there?

A. No, sir; I did not say that.

A. I wasn't on the witness stand.

Q. Are you positive you did not testify down there?

A. No, sir; I wasn't on the witness stand and I did not testify down there.

Q. Who was the hostler who testified down in Roanoke?

A. I don't know; you can't prove that by me.

Q. If you attended these engines, why didn't they have you there before?

A. They didn't call me on the witness stand.

Q. You say you were trying to watch seven or eight engines there at once, weren't you?

A. No, sir; I wasn't trying to do that.

Q. What else were you doing besides that?

A. I told you I put sand on the engines, every engine that came in, and coal.

Q. And you put sand on the engine and what else did you do?

A. I put sand and coal.

Q. And you drew the cinders and clinkers out of them?

A. No, sir; I didn't have a thing to do with that.

[358] Q. You saw that was done?

A. That was done and I drove the engine over the pit for the fire knocker.

Q. You were in the engine when it was being done?

A. No, sir; I was outside.

Q. You watched it being done?

A. Yes, sir; I took it off the pit.

Q. You watched it from the outside?

A. I took the engine off the pit, put coal on it, kept the fire in it, and ran it in the roundhouse and the water man got on it.

Q. This engine came in early in the morning about 8 or 9 o'clock?

A. Yes, sir.

Q. And she set there all day?

A. Yes, sir; until the time she was called.

Q. With fire under the crown-sheet?

A. And water in the boiler.

Q. Were you supposed to be the man to see that water was in the boiler?

A. Yes—no; I am supposed to look over them every now and then, go over them in the roundhouse.

Q. And you just went there every now and then?

A. Yes, sir; the fire and water man, he took charge of them.

Q. And you were around working with other engines, seven other engines that occupied your attention?

A. I was working with other engines.

[359] Q. You cannot tell to save your life whether or not low water might not have gotten on that engine that day while you were working on these other engines?

A. It was full of water every time I looked at it.

Q. You don't know whether it got low water while you weren't looking at it, do you?

A. I wouldn't positively say about that.

RE-EXAMINATION.

By Mr. Hall:

Q. What else were you going to say there, when Mr. Staples

interrupted you; you say you couldn't say whether low water was in there or not, did you say that?

A. Yes, sir.

Q. Did you start to say anything else?

A. It seemed to me like I started to say something else.

Q. This fire and water man, was it his duty to keep the fire up and put the water in?

A. Yes, sir; after it went in the roundhouse.

Q. You had nothing to do with the actual building of the fire and putting in the water?

A. No, sir.

Q. Did you look at the engines from time to time to see that they had water and fire in them properly?

A. I did.

Q. How long does a boiler of water last when the engine [360] is in the roundhouse and not working?

A. You mean a full boiler full?

Q. Yes.

A. It will last about an hour and a half or maybe an hour.

Q. When the engine is standing still in the roundhouse?

A. A boiler full of water will last an hour. I don't mean it will go clean out in an hour, I mean it will come down in the glass about an inch from the top.

Q. How often do you have to renew the water in them when the engine is simply standing in the roundhouse?

A. Five or six times a day.

Q. What kind of a fire is in the engine then?

A. We don't carry a very heavy fire.

Q. What is the object of keeping the fire in the engine?

A. To have them hot and have steam ready to run when they are called.

Q. You don't have to keep up the steam pressure that is used in running, do you?

A. No, sir.

Q. What steam pressure do you ordinarily keep up on the engine in the roundhouse?

A. From 120 to 140, or something like that.

Q. How high do you keep the water in your glass when the engine is in the roundhouse?

A. We aim to keep it above the top of the glass.

RE-CROSS EXAMINATION.

By Mr. Staples:

Q. You remember what you did all of that day, don't you?

A. Certainly I remember what I did all day.

Q. You remember whether you got sick that day or not?

A. No, sir; I didn't get sick.

Q. What were you doing about ten o'clock that morning?

œ361] A. I was filling the rod cups and grease cups.

Q. What were you doing about 11 o'clock that day?

A. I couldn't tell you that; I might have been eating my dinner for all I know, we generally take time to eat our dinner between engines.

Q. Then you cannot tell what you were doing all day?

A. I cannot tell exactly, but I was working all day.

Q. Do you remember that day any more particularly than any other day?

A. Certainly not; a man has got to have his mind on what he is doing every day.

Q. Your statements are made from the fact that you do not think any engine was ever burned in the yard there?

A. I do not think there was ever an engine burned there; I never heard no complaint of it at all.

Q. You do not remember anything that you did on this day any more particularly than you did the day before?

A. We do the same thing every day.

Q. You don't remember this day any more than what

[362] occurred the day before; no man can do that; you couldn't carry any individual day in your mind, could you?

A. No, sir; no more than you could any other day, I do not suppose.

RE-RE-EXAMINATION.

By Mr. Hall:

Q. You heard that night of the accident, or the next day, in which Mr. Andrews was killed?

A. Yes, sir; the next day; I heard it the next morning.

Q. Please state whether or not when you heard the next morning of the going down of this crown-sheet if that impressed on your mind what occurred with reference to this engine the day before?

A. Yes, sir, it impressed it on my mind.

(Witness stands aside.)

[363] H. T. NEECE.

H. T Neece, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. Where do you live?

A. Roanoke.

Q. Where did you live in November, 1912?

A. Roanoke.

Q. What were you doing in November, 1912?

A. Hostler.

Q. Do you remember the day and time when engine 469 had the crown-sheet blown down when Mr. Andrews was killed?

A. Yes, sir.

Q. Did you have charge of that engine any time during the day of November the 14th?

A. Not through the day, only that night after 7 o'clock.

Q. Did you take charge of it at 7 o'clock?

A. Not at 7 o'clock, it was 8 o'clock.

Q. What did you do with the engine?

A. I brought the engine out of the house and taken here around the south side of the coal wharf and got her ready for a call at 8:30.

Q. Had it been called to go out?

A. Yes, sir.

Q. Did you make any examination of that engine before you took it out or after you took it out and before you turned it over to Mr. Andrews?

A I made an inspection of her after I got her out of [364] the house.

Q. Did you try the injectors?

A. Yes, sir.

Q. Both of them?

A. Yes, sir.

Q. Were they working all right?

A. Yes, sir.

Q. Did you try the water glass?

A. Yes, sir.

Q. And the guage cocks?

A. Yes, sir.

Q. What condition were they in?

A. O. K.

Q. Do you always do that before turning an engine over to the engineer who is called to take it out?

A. Yes, sir.

Q. Did you make any examination of the crown-sheet?

A. Yes, sir.

Q. Tell the jury what examination you made of the crown-sheet and how you did it?

A. The brick arch in these MC engines come pretty far back to your door, over the top of your door, and you only can see part of your crown-sheet, and when you have some kind of a light with you you can put it back to the front side of your crown-sheet and see it, you have got to have an awful light fire if you can see it, and these engines, when we bring them from the house, the exhaust from the engine, it raises the smoke and dust off the brick arch and [365] in the engine, it would scatter in there, and I took a bunch of waste and made me a torch and put it on the fire hook and poured in some kerosene oil on it, and put it in there to get to see the crown-sheet.

Q. If there is a bright fire in the fire box, can you see the crown-sheet without a torch?

A. Not all over it; you see the crown-sheet is pretty far back.

Q. What condition did you find this crown-sheet in when you examined it?

A. O. K.

Q. Did it have any pockets in it?

A. No, sir.

Q. Was it leaking?

A. No, sir; that about the pockets, I cannot say whether it had any pockets in it or not, I couldn't see none.

Q. Have you seen the pockets in this crown-sheet since it has been here or have you looked at it?

A. I haven't looked particular at it, I just glanced at it.

Q. If there had been any leaks, would you have seen them?

A. Yes, sir.

[366] Q. Were you on this engine when Mr. Andrews came and took charge of it?

A. Yes, sir.

Q. Did you turn it over to him?

A. Yes, sir.

Q. Was Jerre Walton there when Mr. Andrews took charge of it?

A. No, sir.

Q. When Mr. Andrews came, what did you do?

A. When Mr. Andrews came and got on the engine, I was hooking the fire and throwing in a little coal. He hollored to me to take his bucket and a little grip that he had; I won't say whether he had a bucket, but it was a little grip, and he told me to take it and set it over there for him, and he came up on the engine and sat down on the left side of the engine, and then I clumb over on the right side, had the injector working on the right side of the engine, and he came up on there, and I stood there and hollored to the boy, I said, "All right, let the coal come," and there was so much dust in it he hollored at him to stop, and I stopped him and he said, "Shut that one up and we will put the left injector on and wet this coal."

Q. And did you put on the left injector and work it while he was there?

A. Yes, sir; Mr. Andrews opened the water valve and I put the steam on it.

Q. Did you leave the engine and turn it over to Mr. [367] Andrews?

A. Yes, sir.

Q. Was that the last you saw of the engine before the explosion?

A. No; sir; it wasn't the last time I seen it.

Q. You had nothing to do with it after that?

A. No, sir.

Q. You had nothing to do with the engine after Mr. Andrews took charge of it?

A. No, sir.

Q. What time was that, do you know?

A. It was something about 8:15 or 8:30 when he took charge of the engine. After I set it down at the water tank he took charge of it.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. I believe you told us that you wouldn't like to state whether there were pockets in the crown-sheet or not?

A. No, sir.

Q. And you did not want—being under your oath, you wouldn't make that statement?

A. Yes, sir; I will make that—I don't know though.

Q. You will make what?

A. What did you ask me?

Q. If you will make the statement whether or not there were pockets in the crown-sheet, buckles in the crown-sheet; you told the jury that you did not know whether there were any or not, [368] didn't you?

A. Yes, sir; I told them that.

Q. You told them the truth when you told them that, didn't you?

A. I think I did.

Q. Mr. Neece, how much water was in the engine?

A. When I found the engine?

Q. No, sir; when you turned it over to Mr. Andrews?

A. It was full of water.

Q. How much water was in the tank?

A. In the tank?

Q. Yes, sir.

A. It was filled up after I filled it.

Q. After you filled the boiler you filled the tank?

A. Yes, sir.

Q. Then the boiler and the tank were both full of water when you turned it over to Mr. Andrews for that trip that night. That is a fact, isn't it?

A. Now, I did not fill the tank, but that helper of mine filled the tank, and I stood on the ground and watched it.

Q. You saw it filled?

A. Yes, sir.

Q. And you know that the tank and boiler were both filled when it was turned over to Mr. Andrews?

A. Yes, sir.

Q. You say you poured some kerosene oil on a piece of [369] waste and looked back in that engine under that boiler or under that crown-sheet of that engine that night?

A. Yes, sir.

Q. Then by the aid of that light—was that light enough for you to see that crown-sheet?

A. Yes, sir.

Q. And notwithstanding the fact that you could see the crown-sheet, you refuse to state that there was no buckles in it; that is true, isn't it?

A. Yes, sir.

Q. The stenographer cannot get your nods, you will have to talk out so that he can get them on paper. Where did you get the

kerosene oil?

A. Where did I get it?

Q. Yes.

A. Out of the torch.

Q. The torch on the engine?

A. Yes, sir.

Q. You took the oil out of the engine torch and put it on a piece of waste?

A. On my own torch.

Q. You couldn't have seen the crown-sheet without that light, could you?

A. I guess you could, if you had a bright fire in the engine.

Q. There wasn't enough fire in the engine when Mr. Andrews took it to enable him to see the crown-sheet without a torch,

[370] was there?

A. Mr. Andrews?

Q. Yes, sir; that is what you told us.

A. I don't know about that; he could have blowed the engine if he wanted to have seen the crown-sheet; he could blow the fire in the engine until he got it light enough to see.

Q. He could have made a bright fire in there?

A. It would have taken three or four or five minutes to have blown that smoke and stuff out of there.

Q. What reason did you have—the smoke and stuff you say was in the fire box?

A. Yes, sir.

Q. What reason did you give at the last trial for being so particular about getting a light and using some waste and putting it on the fire hook and examining it?

A. What was the reason?

Q. Yes, sir.

A. There was an engine that had a few stay-bolts that he said was leaking and he claimed that it was done there.

Q. Didn't you testify before that you had been accused of burning engines on the yard by different engineers, and that was the reason why you were particular to get a torch to make an examination?

A. I do not think so.

Q. Do you deny having made that statement at the former trial?

A. I do not think I made it that way.

[371] Q. Do you deny making that statement at the former

trial?

A. I do not think I did.

Q. Didn't you say that the reason for using that torch was that you had been accused of burning engines on the yard and that you used the torch in this particular instance because you had been accused of burning engines; is not that what you said?

A. I said I looked at this engine because they accused people of burning engines at Roanoke.

Q. They had accused the hostler of burning engines at Roanoke, that is what you mean, isn't it, and that is the reason you gave for it?

A. Yes.

Q. When you do find buckling on the crown-sheet, what do you do?

A. I did not hear you.

Q. When you do find buckling in the crown-sheet, if you do find it, what do you do with it?

A. Report it.

Q. When?

A. When do I report it?

Q. Yes.

A. I put it on a little book and then I report it on a big book at the roundhouse.

Q. You keep your books there for that purpose?

A. Yes, sir.

Q. And you never made a report of any buckling of a [372] crown-sheet, have you?

A. I think I have.

Q. You never did that more than one, did you?

A. I made it on one engine, and I guess that engine is still in the service yet; it don't belong to the Virginian Railroad, though.

Q. It is in service, but doesn't belong to them; it was one they just borrowed?

A. No, sir; they didn't have anything to do with it as I know of; but it was a contractor's engine.

Q. When you find this condition in the engine, what becomes of the engine then; who do you turn it over to?

A. I don't understand you.

Q. Do you turn it over to the engineer?

A. Yes, sir.

Q. Did you testify before that when this engine was turned over to Mr. Andrews that you rode the engine down to Franklin

Road?

A. Yes, sir.

Q. You did that, didn't you?

A. Yes, sir.

Q. Where was Mr. Jerre Walton then, if he was the fireman and you turned the engine over to the engineer, and he had gone on his trip where was the fireman? Wasn't he in the engine?

A. This is what I mean, that after I brought the engine out of the roundhouse and set it over on the south side of the coal wharf and taken it around to Franklin Road and brought it back

[373] what they call the straight track to get coal on the engine and put it in the hole to put water in it, and right there the tank is where I turned it over to Mr. Andrews.

Q. Didn't you testify before that after you turned this engine over to Mr. Andrews you rode with him to Franklin Road and got off?

A. No, sir; I do not think I did.

Q. Do you deny stating that?

A. I think I will.

Q. It certainly is true that Mr. Andrews started off from the and he had his fireman with him, didn't he?

A. Yes, sir; but I never seen his fireman, he might have gone on at Franklin Road for all I know.

Q. You didn't have any trouble working these injectors, did you?

A. Not a bit.

Q. Not a bit in the world?

A. No, sir.

Q. You never were an engineer, were you?

A. No, sir; I do not expect to be one.

Q. You never even fired, did you?

A. Yes, sir?

Q. You did fire some?

A. Not to amount to anything though.

Q. How long?

[374] A. About four or five trips.

Q. Can you tell whether an injector is working?

A. I cannot tell you that, for I never had enough experience because I didn't have time to listen.

Q. How did you put on the injector? You said you did, you tested the injector. How did you test the injector and know it is working if you cannot tell when it is working?

COPY BOUND CLO

A. You mean standing still?

Q. Standing still or running or anyway.

A. I will state it while it is standing still, you can hear the injector working all right when she is standing still.

Q. And you never had enough experience on the road to tell whether you can hear one running when the train is running, is that the idea?

A. Yes, sir.

Q. You can sure tell, you can stop and listen with your ears and tell that it is running, so far as the duty of a hostler is concerned, can you, or can you not?

A. I don't understand you.

Q. In other words, just being an hostler, you do not have any trouble with your ears and determining whether an injector is throwing water in the boiler, do you?

A. While standing still?

Q. At any time when you have to fool with it.

A. No, sir; you can always tell when you are working it.

[375] Q. How do you tell it?

A. By the sound of the injector.

Q. What kind of a sound?

A. It has a sort of a ringing sound.

Q. Ringing like something solid or does it have a steam puff to it?

A. It sounds like it has steam force to it.

Q. It sounds like it has a steam force behind it?

A. Yes, sir.

Q. Then that ringing sound, that solid sound, is the water that goes through the pipe and makes it ring, isn't it?

A. Yes, sir.

Q. What kind of a sound does it have when it is not working?

A. A blowing sound: it don't have any sound at all, you can hear it blowing.

Q. The appliances for turning the injector valve are all in the cab, aren't they?

A. The injector?

Q. No, sir: the appliances for turning it, that is all situated in the cab?

A. Yes, sir.

Q. While the injector proper is underneath the cab?

A. Yes, sir.

Q. You were late getting to work that night?

SE IN CENTER

[376] A. I was on time.

Q. Didn't you say you didn't get there until 8 o'clock and that your hour was 7?

A. Yes, sir; that is what I said.

Q. Then you were an hour late?

A. I had other duties to perform before I went to the round-house.

Q. Before you got to this engine?

A. Yes, sir.

Q. When you got to this engine the fire was in it?

A. Yes, sir.

Q. And who attended it for that hour?

A. There wasn't any one.

Q. Was there somebody there when you got to it?

A. My helpers was all there.

Q. Who was there when you got there?

A. I guess there was about fifteen or twenty men there.

Q. Name one of them, please.

A. A fellow by name of Mason.

Q. Name any other witness who is here in attendance upon this trial that was there. Can you do that?

A. No, sir; the day fellows have all gone; what are here are the night fellows.

Q. And Mr. Whitesell was a day fellow, wasn't he?

A. Yes, sir.

Q. And he had gone and you were an hour late in getting to that engine, and he had left it that hour without anybody to attend to it, didn't he?

A. No, sir.

Q. Who was attending to it?

[377] A. The helper.

Q. Which helper?

A. The fire and water man.

Q. Who is he, Mr. Monk Vaughan?

A. He was in the day time.

Q. Who was the man there, I mean the other man?

A. I won't say who it was.

Q. You just imagine that somebody was there?

A. Yes, sir.

Q. Without knowing?

(No answer.)

RE-EXAMINATION.

By Mr. Hall:

Q. Was the whole roundhouse force there when you came in there that night or do you know?

A. I don't know whether the whole force was on or not.

Q. Your force was there, wasn't it?

A. Yes, sir; my force was there.

Q. You were at the head of how many people?

A. Four.

Q. And were all of your men there when you got there?

A. Yes, sir.

[378] Q. You were asked about another engine being made to leak around the stay-bolts, or that you found one that was, and the engineer said that you had burned it on the yard. What engine was that and who was the engineer?

A. I don't remember who was the engineer; it has been about four or five years ago or maybe longer than that.

Q. Where was that engine running?

A. That was running between Victoria and Roanoke.

Q. Did you ever have an engineer to accuse you of burning a crown-sheet at any other time than that time?

A. No, sir.

Q. Was that what you had reference to?

A. Yes, sir; that was done—I forgot who was master mechanic or general superintendent of motive power; he was down there at the station when No. 14 came in and asked for me and I was there and he jumped on me and eat me up about the engine and I told him I never had looked at the engine, I never had looked at none of them, but he eat me up so bad, he said he expected he would have to fire me over it, so that put me a little bit more on to my job.

Q. You looked after that to see whether there were any leaks?

A. Yes, sir.

RE-CROSS EXAMINATION.

By Mr. Hunt:

Q. I believe you told us at the other trial it was not your regular custom to pour oil on waste to make this examination, but you did it to this engine?

[379] A. I done it on all that had this high brick arch and all that didn't have high brick arches.

Q. Didn't you state it was not your practice to do that

but you did it to this engine?

A. That is what I said.

Q. That is what you said, wasn't it, and do you mean to say this accusation against you for four or five years before had just suddenly popped in your mind and made you perform this examination by a torch light contrary to your usual practice, is that what you want to tell this jury?

A. I don't understand you.

Q. Read the question to him again.

(Question is here read to the witness.)

A. I been making that practice all the time.

Q. Didn't you state on the former examination in the Federal Court and didn't you state just a few minutes ago that was not your custom, that it was a departure from your custom?

A. I don't know about that.

Q. If you don't know about it, who in the world would?

A. I guess somebody else would.

By Mr. Hall:

Q. What kind of engine is it that you use a torch to see the crown-sheet?

A. The M. C. engine.

Q. Why do you use a torch with the engine to do that?

A The brick arch comes up pretty high in them, I be-
[380] lieve they are a little higher than in the M. B. engines.

Q. The other engines that do not have that high brick arch, do you have to use a torch to look at the crown-sheet?

A. No, sir.

Q. So you only use a torch with these engine with high brick arches?

A. Yes, sir.

By Mr. Hunt:

Q. You don't mean to say you use a torch with all engines that have that high brick arch. Didn't you tell us that you did not? You just told us that you did not use a torch with all engines that had the high brick arch, didn't you?

A. He didn't ask me that way, I don't think.

Q. Isn't it true that you just happened to use a torch occasionally and you said even with the engines with high arches and engines with low arches, and all engines, that in examining them it was rarely the case that you used a torch, isn't that true?

A. I don't know. That is the way I made the statement. I used it on all engines with high brick arches. This is what I mean:

I used it on all engines that had high brick arches.

Q. Do you now mean to tell the jury that every time an engine was turned over to you that you used a torch for an examination on the high brick arches every time it was done?

A. Yes, sir.

Q. Didn't you state in your examination before that that
[381] was not your practice, even on that class of engine, and that you did it on this particular time because you had these reasons for it? Wasn't that your testimony?

A. I had reason for doing it on all of them.

Q. You don't answer my question. Didn't you on your former examination in the Federal Court state that it was not your practice to examine engines with this torch, that no torches were supplied you for that purpose, no oil was given you for that purpose, no pole was given you for that purpose, to examine even engines of this same type, but that you made this particular examination because of this prior accusation? Isn't that what you stated?

A. Nobody can understand that.

Q. Didn't you make that statement?

By the Court:

Do you understand that question?

Witness:

I don't clearly understand it.

Q. I will ask another one. You were on the witness stand before, weren't you?

A. Yes, sir.

Q. When you were testifying before, didn't you state that even with engines of this type with the high brick arch that it was not your practice to examine them with a torch, that no torch was furnished you for the purpose, that no waste was furnished you for the purpose, no oil was furnished you for the purpose, but that you did make this examination because of that prior accusation? Didn't you state that?

A. I don't know. But oil and stuff is furnished to us, or
[382] anything that we want, so that we do not carry it home.

By the Court:

He is asking you what you said when you testified before in the United States Court.

Witness:

What did I say?

PAGE CUT OFF

By the Court:

He is asking you if you did not say in the United States Court that it was not your practice to examine engines with high brick arches because no oil, no pole, no torch, was furnished you. He is not asking you what was furnished you, but he is asking you whether you said that in the United States Court. Do you understand it now?

Witness:

No, sir.

By the Court:

Mr. Morris, read the question to him very slowly.

(Question is here read to the witness.)

Witness:

I don't know whether I did or not.

Q. You don't know whether you did or not?

A. No, sir.

Q. Now, I know you don't want to do anything that isn't right in the case. How many of these high engines—how many times in your experience with the Virginian Railroad do you reckon you ever examined with a torch?

A. I don't know; but a good many of them.

Q. As many as half a dozen times?

A. Each time.

Q. Do you suppose you ever did that as much as six times in your life?

A. To each engine?

[383] Q. No; with all engines of that type?

A. Yes, sir; more than that.

Q. More than six times?

A. Yes, sir.

Q. You did it as many as half a dozen times altogether, you reckon?

A. Yes, sir.

Q. Well, now, how many times do you ever reckon you did that?

A. I can not count it up.

Q. Well, approximately?

A. It has been going on for a good while.

Q. Approximately speaking, how many times do you suppose you ever did that?

A. It depends on how many trips the engines make.

Q. I am not talking about what it depends on, I am talking about the number of times you have done it; how many times do you suppose you have done that?

Q. How many times do you suppose you have ever examined engines with high brick arches, with torches?

A. I do not know how many times, but a good many times.

By Mr. Hunt:

Mr. Hall, would you mind letting me have the record of the evidence taken down by the stenographer when this witness was on the stand in the Federal Court in Roanoke? I would like to see what he did say in regard to the question that I have asked him about.

By Mr. Hall:

I will see the evidence and let you know later.

[After recess counsel for defendant (Mr. Hall) handed the evidence asked for above to counsel for the plaintiff.]

[384] (Witness stands aside.)

[385] W. J. PHARR, RECALLED.

W. J. Pharr, recalled, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. You identified Mr. Andrews' report of November the 13th, 1912, when you were on the witness stand before, I believe?

A. Yes, sir.

Q. The work required on that report was, "Tighten Knuckle Pin, Right Front, Renew Side Rod Bushing to Driver No. 2, Right Side." I wish you would state whether or not the knuckle pin, right front, had anything to do with the crown-sheet or the injector or water glass or water cocks?

A. Not a thing in the world, sir.

Q. The next thing is renew side rod bushing to driver No. 2, right side. That had nothing to do with any of those things, did it?

A. That is underneath the whole business; that is the machinery part; this is on the boiler.

Q. "Set up Wedges"?

A. That is underneath the edging.

Q. It had nothing to do with the boiler or any of its appliances?

A. No, sir.

Q. "Overhaul lubricator, to air reverser." That had nothing to do with the boiler or any of its appliances, did it?

A. No, sir.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. The steam ram of the right injector did have something to do with the boiler?

A. It wouldn't have anything to do with the injector, only a little steam escaped there, and we packed that with asbestos.

Q. The amount of steam that would escape depends on how much it gets out of fix?

A. No, sir; if you take all of the packing out of it, it
[386] wouldn't have anything to do with it.

Q. You think it would work all right if you took it all out?

A. Yes, sir; I am certain it would.

Q. You think the injector was in good shape, then?

A. I don't know of any reason why it should not be; there was no report on it.

Q. It certainly ought to force plenty of water in the boiler if it was?

A. Yes, sir.

(Witness stands aside.)

[387] R. H. SCOTT.

R. H. Scott, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q Were you employed as a conductor by the Virginian Railway at the time this accident to Mr. Andrews occurred?

A. Yes, sir.

Q. You are still employed in that capacity, are you not, by the same company?

A. Yes, sir.

Q. Did you have charge of this train that Mr. Andrews' engine was pulling at the time the explosion occurred?

A. Yes, sir.

Q. What time did you report for duty that evening before

leaving Roanoke on the 14th of November, 1912?

A. 9 o'clock.

Q. Did you come in on that train?

A. Yes, sir; which way do you mean?

Q. From Princeton?

A. Yes, sir.

Q. Did you have that engine?

A. Yes, sir.

Q. Coming in?

A. Yes, sir.

Q. Who was running it?

A. Mr. Andrews.

Q. Can you state after November 11th what trips that engine made until the time of this explosion?

A. Yes, sir; by looking at my book.

[388] Q. I wish you would look at your book and tell what the first trip was that you made on or after November the 11th?

A. We left Princeton on the 11th and arrived at Roanoke on the 12th.

Q. What time did you leave Princeton on the 11th?

A. 9:45 p. m.

Q. And you arrived at Roanoke when?

A. 9:30 a. m. of the 12th.

Q. When did you go back to Roanoke?

A. We left Roanoke 6:15 p. m. of the 12th and arrived in Princeton 7:20 a. m. the 13th.

Q. Now, on that trip from Princeton to Roanoke and return, was your train pulled by engine 469?

A. Yes, sir.

Q. Was Mr. Andrews the engineer?

A. Yes, sir.

Q. Now, when did you leave Princeton again?

A. We left there 10:30 p. m. of the 13th and arrived in Roanoke a. m. the 14th about 6:30; I haven't got the time on my book.

Q. You haven't got the time of arrival in your book in Roanoke on the morning of the 14th?

A. No, sir.

Q. When you were called to report for duty on the evening of the 14th to take the train out, did you find Mr. Andrews there when you came?

A. Yes, sir; I met him at Franklin Road.

[389] Q. Was he on his engine then?

A. Yes, sir.

Q. Was the engine hitched to the train?

A. No, sir.

Q. Did you see Mr. Andrews make any examination of that engine or any part of it?

A. I saw him looking in the fire box after we got on the train.

Q. Where was that?

A. That was at the west end of the yard.

Q. Tell the jury how he did it?

A. He got down and took a shovel and held it up like this (indicating), and looked over into the fire box, down on his knees.

Q. Looked at the crown-sheet?

A. Yes, sir; he was looking up in there; I suppose he was looking at the crown-sheet.

Q. Is that the usual way engineers make an inspection of the crown-sheet?

A. Yes, sir.

Q. You see them do it quite often, don't you?

A. Yes, sir; quite often.

Q. Then after you left the Roanoke yard was your train stopped anywhere between there and the point where the accident occurred?

A. No, sir.

Q. What was the first thing that you knew of the ac-
[390] cident?

A. The first I heard of it was the flagman made a remark, he said, "We have hit some one," and he walked out on the platform, and he said, "We have hit some one."

Q. It is not necessary to tell what he said, let us get along. Did you feel a check or anything like that?

A. No, sir; it was a very nice stop.

Q. What did you do then?

A. We heard them hollering and I went over to where I found them, and Mr. Walton was the first man I found.

Q. Where did you find Mr. Walton?

A. He was lying down the bank about fifteen or twenty feet from the train.

Q. On which side?

A. The left side coming west.

Q. He was thrown out on the fireman's side, was he?

A. Yes, sir.

Q. Who did you find next?

A. Mr. Andrews.

Q. Where did you find him?

A. He was about three or four car lengths west of Mr. Walton, sitting up by the side of the track.

Q. Further on than Mr. Walton was?

A. Yes, sir; on the left side.

Q. Where did you find Mr. Lucas, the front brakeman?

A. Just across from Mr. Andrews, on the right side.

Q. On the right side?

A. Yes, sir.

[391] Q. Did you get up on the engine then?

A. Only up on the step, after I got some bed clothing and prepared to take care of them the best I could, I got up on the steps and I noticed one of the stoker holes being out and I looked through that and I saw no fire in the engine, and I went to the phone.

Q. Did Mr. Andrews ever make any statement to you about having been discharged from other railroads for burning crown-sheets?

A. I heard him say he lost the first job for burning an engine.

Q. How many railroads did he say had discharged him on account of burning engines?

A. I do not remember how many he said, and I do not remember what railroads they were.

Q. How far was the point of explosion west of Singer?

A. It was about two and one-half miles.

Q. How far is LaFayette west of Singer?

A. About a mile, very near a mile.

Q. How far from LaFayette is it to the point of this accident?

A. As well as I remember, where the mile post stands, about a mile and a half.

Q. Can you locate or identify the mile post close to which this explosion occurred?

A. Yes, sir.

Q. What is it?

A. Mile post 264, I think is the closest.

[392] Q. How near is it to mile post 264?

A. Very close to it, part of the train was standing about mile post 264.

Q. And the engine was on beyond that a little distance?

A. Yes, sir; a little distance.

Q. What time at night did this explosion occur?

A. 10:20.

Q. What kind of a train were you pulling?

A. Empties and three loads.

Q. How many empties?

A. I think I had eighty cars, I think it was.

Q. And a caboose?

A. Yes, sir.

Q. Can you give us any idea how fast this train was running at the time it left Singer tank until the explosion occurred?

A. Between Singer tank and LaFayette we were making about fifteen or eighteen miles an hour, we struck the grade there and at the time of the accident we were making between eight and ten miles an hour.

Q. Is there a grade from LaFayette up to the point of the accident?

A. Yes, sir.

Q. State whether or not it is a heavy pull with a train such as you were pulling?

A. It is quite a heavy pull.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. Mr. Scott, after this crown-sheet went down, the engine went how far?

A. They went about thirty or thirty-five car lengths, probably forty cars.

Q. They went probably forty cars after the pulling power of the engine had ceased altogether, didn't you?

[393] A. I don't know whether he had the engine shut off or not, there was still steam on it for a while.

Q. With that crown-sheet down you couldn't shut it off any shutter, could you? There isn't any way to shut it off any tighter?

A. I don't know how long it took the steam to escape, and it was a little down grade there.

Q. That is what I am coming to; it drifted for as much as forty cars after the entire pulling power of that engine was done away with, didn't it?

A. Yes; between thirty-five and forty.

Q. Then that wasn't a heavy pull there, was it?

A. No; we had gotten over the heavy pull, we were turning the grade.

Q. You had passed by the heavy pull at the time of this acci-

dent, hadn't you, up to that point?

A. We had passed that heavy pull.

Q. You passed all the heavy pulls up to that point at the
[394] time of that accident, didn't you?

A. Between there and Roanoke we had.

Q. That was the way the train was going?

A. Yes, sir; between there and Roanoke we had passed all the heavy pulls.

Q. When you went up to the engine you found Jerre first lying on the left side?

A. That is when I started over; yes, sir.

Q. Jerre was perfectly conscious, wasn't he?

A. So far as I know he was.

Q. Didn't he, while lying there in that condition, tell you that this engine had gone down when it was full of water?

Q. Answer the question.

A. Yes, sir.

Q. Mr. Scott, who was present when Mr. Andrews told you that he had lost his position by reason of burning an engine?

A. Part of my crew.

Q. Name them.

A. I think Mr. Adams was one of them.

Q. Where is Mr. Adams?

A. Really, I don't know.

Q. You have no idea where he is?

A. No, sir; he has left here.

Q He has left and gone?

A. Yes, sir.

Q. Name one that we can get hold of, if you can?

[395] A. I don't know where he is at, but the fireman, I have forgotten who the fireman was; if I could get hold of my books about that date I could tell you. You see, we had a crew, probably an extra crew about that time, and I don't remember who they were. We were sitting there talking.

Q. Mr. Walton was firing, wasn't he?

A. No, sir; I do not think he was at that time.

Q. When was it he told you that?

A. Two or three years ago.

Q. Two or three years before this accident?

A. A year, probably before the accident; we were sitting there talking about it.

Q. Where were you sitting?

A. At Fagg; under the water tank at Fagg.

Q. And you cannot recall who was present, but you can remember where you were sitting?

A. I remember Mr. Adams was braking for me at the time, but I do not remember who the other crew was.

Q. What impressed this fact upon your mind?

A. Which fact?

Q. The fact that he told you that he had lost his position by reason of burning an engine?

A. We were talking about the different railroads, Mr. Andrews and I. We met on the same railroad and we have been together nearly all the time except after he left the C. & O., until he got back to the Norfolk & Western. We were not separated, we were together on the Norfolk & Western and together on the Virginian
[396] most of the time.

Q. Did you run together much?

A. Yes, sir.

Q. You were put on the witness stand at the other trial by Mrs. Andrews' side as her witness?

A. I was summoned by both sides, but I am here to tell the truth as near as possible.

Q. You were on the witness stand before and put on by Mrs. Andrews before?

A. Yes, sir.

Q. Did you or not state at that time to the court and jury that Mr. Andrews was regarded as one of the most careful and painstaking engineers in the service of the Virginian Railroad?

A. So far as my knowledge, and I say so right today.

Q. You say it now?

A. So far as I knew, he was a sober man.

Q. You said he was regarded as one of the best men on the road?

A. I do.

Q. You say that now?

A. Yes; I say he was a good man.

Q. Mr. Andrews was one of the regular engineers of the road, who had a regular assigned run, didn't he?

A. Yes, sir.

Q. The road has numerous engineers who act as substitutes, haven't they?

A. Yes, sir.

[397] Q. The best men are on the regular runs or supposed to be?

A. Not in all cases; no, sir. We have some extra men who are much better than the regular men.

Q. The oldest men in point of service?

A. The oldest men in the service get the preferred run.

Q. And he was one among the oldest men in the service?

A. Yes, sir.

Q. You were the conductor with Mr. Massie on the trip before Mr. Andrews took this engine back, weren't you?

A. Yes, sir.

Q. That was the same engine, wasn't it?

A. Yes, sir.

Q. Didn't Mr. Massie, the engineer, have some trouble with that engine that day?

A. Coming east we did not have any steam, and we stopped a couple of times to blow up steam.

Q. That is rather an unusual occurrence, isn't it, when an engine is working properly?

A. I don't know anything about how the engine was working, that is out of my line.

Q. I say, having been a conductor for a number of years, it is an unusual occurrence for it to stop to blow up steam if the engine is working properly, isn't it?

A. That depends on the fireman. Some firemen, you know, cannot keep the engine hot.

Q. Jerre wasn't the fireman, was he?

[398] A. No, sir.

Q. Now, then, isn't it true that when your engine is working properly and the fireman doing his duty properly, that your stops on this trip before, when Mr. Massie was running the engine, on account of failure to get steam, was rather an unusual occurrence?

A. Yes, sir.

Q. It was?

A. Yes, sir.

RE-EXAMINATION.

By Mr. Hall:

Q. You say you had to stop a couple of times on the previous trip when Mr. Massie was running the engine?

A. The trip that Mr. Massie was running.

Q. Was that prior to November the 11th?

A. I can see from my book.

Q. Just look at your book and state when it was.

A. It was on the 9th.

Q. Who was the fireman on that trip?

A. Mr. Carr.

Q. Do you know whether he was an experienced fireman or not?

A. I don't know how long he had been firing.

Q. I wish you would state whether or not it depended on the fireman to keep the steam up?

A. If the engine is in good condition and good coal, it
[399] depends on the fireman.

Q. And doesn't it sometimes happen that firemen sometimes let the fire get down?

A. Sometimes it happens that the fireman lets his fire get away from him.

Q. Does that occur often with a good fireman?

A. Sometimes.

Q. What do you do then?

A. Sometimes we have to stop until he can build the fire up, and if we haven't a very heavy grade we can lighten up on the throttle and let him catch up, providing he hasn't let the water get away from him.

RE-CROSS EXAMINATION.

By Mr. Hunt:

Q. You have your book there showing the time when you leave and arrive at destinations, haven't you?

A. Yes, sir.

Q. Will you tell on this trip with Mr. Massie whether you were going east or west, the time you had the trouble?

A. Coming east.

Q. Will you look at your book and tell when you left Princeton?

A. Yes, sir.

Q. Please do so.

A. We left Princeton at 2:30 p. m.

Q. On the 9th?

[400] A. Yes, sir.

A. And got to Roanoke at when?

A. 5:10 a. m. of the 10th.

Q. How many hours is that behind the usual run?

A. At that time we generally made the run about ten or eleven hours.

Q. And this consumed how many hours?

A. 2:30 to 5:10.

Q. About thirteen hours?

A. Yes, sir.

Q. It was about three hours delayed by reason of the trouble which you had with the engine on that trip, fourteen hours and forty minutes, to be accurate?

A. Yes, sir.

Q. You lost about four hours and forty minutes on that trip by reason of the trouble you had with the engine?

A. It was not necessary for it all to be that, probably we had some meets, and got delayed on that.

Q. Will your book show meet orders?

A. No, sir.

Q. If you lost time for any other reason on that trip except the trouble you had with the engine, you have no knowledge of it?

A. No, sir; I don't remember of it.

Q. Isn't it true that the fireman, the oldest fireman in point of service, are also given regular runs?

A. Yes, sir; they get in their run.

[401] Q. Then the fireman that Mr. Massie had with him, from the point of service, at least, was one of the oldest firemen on the road, wasn't he?

A. No, sir; he was an extra fireman.

Q. He was extra?

A. Yes, sir.

Q. He wasn't on his regular run?

A. He has no train, just an extra man, used in emergency.

Q. Who was Mr. Massie's regular fireman?

A. Mr. Mason.

Q. What was the fireman's name in this instance?

A. You mean that was with Mr. Massie?

Q. Yes.

A. Mr. Carr.

Q. Is that the Mr. Carr who was on the witness stand awhile ago?

A. No, sir.

Q. Mr. Carr is not here, is he?

A. No, sir.

Q. Mr. Adams is not here?

A. No, sir.

Q. Mr. Massie is not here, is he?

A. No, sir.

By Mr. Hall:

Q. Mr. Scott, that wasn't Mr. Massie's regular engine, was it?

A. No, sir; Mr. Massie was an extra man.

[402] Q. He was an extra man?

A. Yes, sir.

Q. Why did he happen to be running that trip, do you recall?

A. I suppose he stood first out on the extra list and Mr. Andrews was off.

Q. Does your record show how much time you actually stopped to blow up steam?

A. Not on my book; but you will find the report in the superintendent's office.

Q. Have you any recollection of how much time you actually lost by blowing up steam on that trip?

A. No, sir; I do not recollect exactly how much.

(Witness stands aside.)

(The court takes a recess until 2 o'clock p. m.)

THURSDAY, OCTOBER 8, 1914, 2 P. M.—AFTERNOON SESSION.

Continuation of the evidence on behalf of the defendant, in chief.

[403] H. L. THOMAS.

H. L. Thomas, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. You are employed by the Virginian Railway, are you not?

A. Yes, sir.

Q. What was your occupation on the 14th day of November, 1912?

A. Engineer.

Q. For the Virginian Railway Company?

A. Yes, sir.

Q. Did you go to the place where this wreck occurred?

A. Yes, sir.

Q. Who was there before you?

A. Conductor Scott.

Q. So you were the second man who got there?

A. Yes, sir.

Q. Did you examine the engine when you got to the scene of the wreck?

A. Yes, sir; I got up on the engine.

Q. Did you find the window on the right hand side of the cab, that is, the engineer's side, open or closed?

A. I found it closed.

Q. Did you examine the injectors?

A. Yes, sir.

[404] Q. In what position did you find those injectors?

A. I found both injectors, the water valves open and the steam valve open also.

Q. Was that the proper position for throwing water into the boiler?

A. Yes, sir; if they had been put on properly.

Q. Did you hitch your engine to this train and carry it on?

A. I taken it to Fagg.

Q. And there you turned it over to another engineer?

A. I didn't turn it over to anybody, not my engine.

Q. The engine was taken to Princeton by some other engineer, wasn't it?

A. Yes, sir.

Q. How long have you been an engineer?

A. Three years and six months.

Q. And before that I suppose you fired?

A. Yes, sir.

Q. For how long?

A. Four years.

Q. What is the custom of engineers as to the inspection of the crown-sheet when they take charge of an engine?

A. The custom of engineers when they get on the engine is to turn the blower on, open the fire box door and get down on their knees or stoop over in position so that they can see the crown-sheet.

Q. Do they always do that when they first take charge [405] of an engine?

A. Yes, sir.

Q. Can a man who is firing an engine along on the road running through country such as between Roanoke and the point of this

accident, examine the crown-sheet of his boiler without getting down on his knees and looking in?

A. No, sir.

Q. Can he do it while he is simply throwing coal into the fire box without stooping and getting down on his knees?

A. No, sir.

Q. In this kind of a country, can a fireman from his position on the inside of the engine, or from his position down in the pit where he is firing, hear the injector working when the window on the right side of the cab is closed?

A. No, sir.

Q. Can the engineer tell?

A. No, sir; the exhaust of the engine kills the sound of the injector.

Q. In what distance will the water in a boiler of an engine of the class engine 469 become exhausted when that engine is running between Singer and the point of the accident and the water glass showed water within half an inch of the top of the glass, the engine pulling a train of about eighty cars?

Plaintiff objected.

Q. Very well, I will ask another question. Have you observed the water in your engine, how often the water in the boiler has to be renewed under working conditions?

A. I have never tried that.

[406] Q. You have never tried that particular experiment?

A. No, sir.

Q. But is it your custom and practice to keep a check on your water and does your practice give you an idea of how soon water in the boiler will be exhausted where the injector is not supplying water?

Plaintiff objected.

Q. Very well, I will change it and will not use the word "idea" but will say "knowledge". Does it?

A. As I said, I never kept the injector off for any length of time, but by having the injector shut off when we started the train and noticing the water that way I would judge it would take—

A. With the injector shut clean off, are you talking about?

Q. With the injector not throwing water into the boiler.

A. With the injector not putting water in your boiler?

Q. What I want to know is, do you know, have you knowl-

[407] edge of how fast water is consumed in your engine under working conditions?

A. Well, I just don't exactly understand what you mean; you are trying to say how much water he had in this glass when he passed Singer tank?

Q. No; here is what I want to know: whether or not your experience as an engineer has given you any knowledge as to how rapidly your engine will consume water, as to how long a tank of water will last.

A. How long a tank of water will last?

Q. Yes; under working conditions, when you are working under steam?

A. Not ever having an injector shut off in order to try it, I couldn't say.

Q. Is this a hard place to keep water in your boiler?

By Mr. Staples:

What?

Q. From Singer to Iron to, or to the point of accident?

A. No, sir; not an unreasonably hard place; it depends on how a man will be working his engine.

Q. If his engine is not working right, will the water get out of the boiler easily?

A. No, sir.

Q. My question was, if the engineer does not work his injector and the engine properly, is it or not a place that will knock the water out of the engine quickly?

A. If he does not work his engine properly?

Q. Yes, sir.

[408] A. If he is going through there running at any rate of speed, which we do through this country about fifteen or eighteen miles an hour, and his engine is not working properly, you would exhaust the water quicker than if you were working the water properly or working your engine properly.

Q. How do you tell whether the injector is working properly and throwing water into the boiler?

A. When your engine is running they have a little overflow pipe as I call it, right under the cab, and you can look down and see whether it is picking up all the water around, if not picking up all, some of it will be running out of this little pipe.

Q. Do you have to put your head out of the window to see that?

A. Yes, sir.

Q. Can you see it with the cab window shut?

A. No, sir.

Q. In ordinary work, how many injectors would an engineer use?

A. One.

Q. Is one injector sufficient to keep enough water in the boiler for ordinary purposes?

A. Yes, sir.

Q. Could two be used at this point, under ordinary circumstances, without flooding the boiler?

A. That depends on where he had his water in his boiler.

[409] Q. I mean if the water in the boiler was at the regular height, as the witness here has testified to ,within a half an inch of the top of the glass?

A. The second injector would get too much water and it would also get your steam so low that you wouldn't be able to pull your train up over this grade.

Q. Ordinarily, does the engineer work the injector on the left hand side of his engine, or does he have the fireman work it?

A. Ordinarily he has the fireman to work it.

[410] Q. Under what circumstances would an engineer put the injector on, on the left hand side of the engine, himself, and not call on his fireman to do it?

A. In case his right injector was working all right?

Q. Yes, sir; in case the right injector was working all right.

By Mr. Hunt:

We object to the question because he is taking into consideration the personality of the engineer.

Objection overruled. Plaintiff excepted.

[411] A. In case the right hand injector was working all right, you mean?

Q. Yes, sir.

A. Under what condition would an engineer put on his left injector himself?

Q. Yes.

A. Well, he would be kind of what you might call excited and wouldn't feel like depending on his fireman to put this injector on; he would fell like his fireman wouldn't put it on like he would and he would want it on right.

By Mr. Hunt:

We ask to exclude that answer.

By the Court:

Q. Suppose the water in that boiler had reached a point where it still covered the crown-sheet and the engineer wanted to use both of these injectors at the same time, would that show excitement?

A. If he thought his water was about to get off his crown-sheet, it would; yes, sir.

Q. Would it show excitement for him to put it on?

A. Yes, sir; he go over and put it on himself and not depend on his fireman to put it on at all.

Q. Would it show excitement for him to go and do a thing himself rather than to instruct somebody else to do it if the water was getting very low on the crown-sheet or if he discovered the water was getting very low on the crown-sheet?

[412] A. Yes, sir; he would do it himself; the engineer would put it on himself.

Q. Would you put it on yourself under those circumstances?

A. Yes, sir.

Q. Would that show excitement on your part?

A. To a certain extent; yes, sir.

Q. Wouldn't it be excitement which was perfectly proper, it wouldn't show you were rattled, would it? Do you mean by excitement you would be rattled or be very diligent?

A. It means I wouldn't have any confidence in the fireman to get the injector to work and therefore I would go and put it on myself.

Mr. Wingfield continuing direct examination:

Q. If the water was just getting down a little bit from the top and you wanted to get it up, would you call over to your fireman to put that other injector on or go yourself?

A. No, sir; I would get the fireman to put it on then.

By the Court:

I do not think the evidence is proper as to what a man would do under certain conditions.

Q. What would the average engineer do under those circumstances?

[413] Q. Mr. Thomas, if an engineer discovers that his water is getting low as to present the danger of leaving his crown-sheet uncovered, and of the water getting below the crown-sheet, and he wants to put on his left injector, the right one being on,

would he call to the fireman to put that left injector on or would he go across and put it on himself?

Plaintiff objected. Objection sustained. Defendant excepted.

[414] Q. Now, Mr. Thomas, where are the injectors?

A. They are outside right under your cab window.

Q. And where are the pipes leading into the boiler from the injectors?

A. They run from the injectors outside up through or what we call the running board, outside the front of the cab window.

Q. And not inside the cab?

A. No, sir.

Q. How does this injector work? I mean by that, does the engineer have to adjust the valve to throw water into the boiler?

A. Yes, sir; he has to adjust the water valve for this reason, if your engineer had 180 pounds of steam on it you have your water valve opened, and if your steam varies from 180 pounds say back to 160, you have to cut your water valve down.

Q. Does an engineer have to prime the injector valve?

A. Yes, sir; if he pulls the steam valve open, as we call it, too quick, it will blow the water through your overflow; but if you open it gradually and let it unite it will go into the boiler.

Q. Under what circumstances may the injector be working and no water going into the boiler?

A. By having too much steam or too much water for your steam, or not enough steam for your water.

CROSS-EXAMINATION.

By Mr. Staples:

Q. You say the injector is working then, you mean not working then, although the steam is turned on, don't you?

A. What do you mean?

Q. You said the injector may be working and no water going into the boiler. You mean the injector had failed to work, don't you, although the steam and water were both turned on?

A. If it was turned on properly.

[415] Q. It wouldn't work although they were turned on improperly?

A. If it was turned on improperly they wouldn't work.

Q. You say that Conductor Scott was on the engine before you. You don't know what he did there, do you?

A. No, sir; I do not.

Q. You don't know whether he monkeyed around with the left injector to find out whether it was on or not, do you?

A. No, sir; I do not.

Q. You don't know anything as to what Mr. Fitzgerald did when he was there, do you?

A. No, sir.

Q. He was there ahead of you, wasn't he?

A. No, sir.

Q. Who was Fitzgerald?

A. He is an engineman.

Q. Wasn't he there about that time?

[416] A. Yes, sir; I was on the engine that came down the hill ahead of his engine and as soon as we coupled up I got off my engine and got up on Mr. Andrews' engine, and Mr. Fitzgerald, as I was going back to my engine, was coming to look at it.

Q. And you say that Mr. Fitzgerald was not there before you?

A. No, sir.

Q. Now, Mr. Thomas, if an engineer starts his injector to working and running his engine along and the water creeps gradually up and up and up in his water glass, that shows it is working, doesn't it?

A. Yes, sir.

Q. If the steam pressure in the boiler of the engine keeps up sufficiently to keep the engine running, there is no reason why the water should stop flowing through the injector, is there?

A. No, sir.

Q. If an engine leaves Roanoke and the injector is put on as it leaves, the right injector, and the water in the water glass continually rises and shows that the water in the boiler is continuing to increase, doesn't that show necessarily that the injector is working?

A. Yes, sir.

Q. And if it is that way all the way to Singer water tank that shows the injector is working when it hits Singer water tank?

A. Yes, sir.

Q. Unless it is turned off it shows that it is bound to keep

[417] on working after it leaves Singer water tank, doesn't it, Mr. Thomas?

A. Yes, sir.

Q. You say an engineer always stoops down when he gets on the engine. Does he always do that?

A. Stoops down to look at his crown-sheet.

Q. Does he always look at his crown-sheet?

A. All engineers ever I fired for and all engineers ever I was on an engine with, as well as myself, always inspect the crown-sheet the first thing.

Q. You mean if you inspect the crown-sheet you couldn't see much in there; you cannot tell much about it looking at it that way, can you; you can't tell much about it looking at it across a fire in your face and the red glare in the fire box; you can't tell much about the crown-sheet by looking at it that way?

A. You can tell whether it has been burned or not.

Q. How can you tell whether it has been burned or not; you say you can tell that?

A. Yes, sir.

Q. How would you tell?

A. Usually when they have been burned there is a leak around the crown-bolts.

Q. You mean you can tell whether it is leaking or not?

A. You can tell whether it has been burned by the leaks [418] around the bolts.

Q. Suppose it did not leak?

A. Then you could tell by the color of the crown-sheet.

Q. What color would it be?

A. In its original color it is a black sooty looking, and then if it was burned it would have a blue indication.

Q. And you think that with all that red glare in your face, the fire box full of smoke and glare, you could detect the difference between blue and black?

A. We don't usually have that kind of a fire when we get on the engine; we turn the blower on so you can see your crown-sheet.

Q. Did you ever look in the fire box and see it burned that way?

A. No, sir.

Q. What makes you think it could be done?

A. By looking at this one over here.

Q. You base your opinion on that?

A. By telling whether the crown-sheet is burned or not.

Q. And you never have detected anything wrong with a crown-sheet as far as the color is concerned by looking in there, in the way you have described?

A. No, sir.

Q. Now, the grade from Singer tank to the point of this accident is a good grade, isn't it?

A. From Singer to the point of this accident?

Q. Yes, sir; it is a good easy running grade, isn't it?

A. By Sheriff Martin's house it is a pretty steep pull.

[419] Q. How long a pull is that?

A. I should judge it was about not quite half a mile.

Q. The balance of it is good running, isn't it?

A. It is kinder level.

Q. It is kinder level all the balance of the way?

A. Yes, sir.

Q. If an engineer quits his post of duty and goes and turns on the injector on the fireman's side, would the fireman be mighty apt to know that?

A. I do not see any reason why he should not.

Q. He is sitting right there by it?

A. Yes, sir.

Q. Particularly if he had been firing there just four or five seconds before the crown-sheet goes down he certainly ought to know whether the engineer was over there turning that thing on at that time?

A. Yes, sir.

Q. He couldn't hardly help from knowing, could he?

A. I don't see how he could.

Q. If an engineer discovered the water in his boiler was low he would tell the fireman about it; he wouldn't have him there exposing his life to danger without telling him, if there was any danger of blowing him up?

Defendant objected. Question withdrawn.

RE-EXAMINATION.

By Mr. Wingfield:

Q. Suppose the fireman was leaning out of the window, had his head out of the window, could he tell?

A. The water valve is so close to the fireman's seat box and him being on the seat box, the engineer would be bound to strike him somewhere in putting the injector on.

[420] Q. Even with his head leaning out of the window?

A. Yes, sir.

Q. When you look into the fire box and inspect the engine before making a run, can you see the crown-sheet clearly and distinctly?

A. Yes, sir.

Q. And observe its color?

A. Yes, sir.

Q. When the injector is put on and the engine continues to steam, if the pressure of the steam should fall down or should increase, would that effect the flow of water through the injector into the boiler?

A. Not unless you changed the water valve, if the steam fell down as low as 160 pounds, you would have to change your water valve.

Q. If you did not change it would the water continue to go into the boiler?

A. A part of it would.

Q. But not as much?

A. No, sir.

Q. Then the injector could still be working and you would be wasting the water?

A. Yes, sir.

Q. If the engineer should happen to cut the injector off
[421] for any reason during his trip, would it or would not it be necessary for him to put it on properly again before it would throw water into the boiler?

A. Yes, sir; he would have to put it on properly.

Q. If he did not put it on properly, it would not throw water into the boiler, would it?

A. No, sir.

RE-CROSS EXAMINATION.

By Mr. Staples:

Q. You don't mean to say there is anything complicated about an injector, do you? It is a simple thing?

A. It is a simple injector, it is one of the most simple injectors I ever saw.

Q. Any engineer can work them, can't he?

A. Yes, sir.

Q. There is no trouble doing it, is there?

A. I don't see why he could not if he has had any experience at all.

Q. Even a hostler can do it, can't he?

A. Yes, sir; they do put it on.

Q. If the steam remains up about the popping off point, and the water and steam valves open, it is bound to throw water into the boiler, if it started doing that in the beginning?

A. Yes, sir.

By Mr. Wingfield:

Q. If the water ram is wide open, under those circumstances would it put water into the boiler?

A. With the engine hot?

[422] Q. Yes.

A. Yes, sir.

Q. When the water ram is wide open?

A. Yes, sir; when the water ram is wide open.

(Witness stands aside.)

[423] R. H. SCOTT, RECALLED.

R. H. Scott, recalled, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. When you got on this engine after the explosion, did you put the left injector on?

A. No, sir.

CROSS-EXAMINATION.

By Mr. Hunt:

Q. One question I neglected to ask you when you were on the witness stand before, when you saw Mr. Andrews looking in the fire box, did he have any torch there to help him see?

A. No, sir.

Q. That was just a few minutes after this hostler had turned it over to him, wasn't it?

A. I don't know what time the hostler turned the engine over to him.

Q. He said he turned it over to him just before he went?

A. It was fifteen minutes after my reporting time when he looked in the fire box.

Q. He didn't have any torch, did he?

A. No, sir.

RE-EXAMINATION.

By Mr. Hall:

Q. How long was Mr. Andrews required to report ahead of you?

A. Fifteen minutes.

Q. And it was fifteen minutes after you had reported
[424] that you saw him?

A. Yes, sir; fifteen minutes after I reported.

Q. When you saw him examining his crown-sheet?

A. Yes, sir.

Q. Did he put the blower on?

A. Yes, sir.

Q. What effect does that have?

A. I understand from the engineers that it gets rid of the smoke.

By Mr. Hunt:

We object to that.

Q. Do you know?

A. No, sir.

Q. You do know that he put the blower on when he examined the crown-sheet?

A. Yes, sir.

(Witness stands aside.)

[425] C. L. RICHARDSON.

C. L. Richardson, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. Are you an engineer on the Virginian Railroad?

A. Yes, sir.

Q. Have you run engines of the same kind as 469?

A. Yes, sir.

Q. What is your regular engine?

A. 479.

Q. Were you running an engine of that order at the time and before the accident to Mr. Andrews?

A. Yes, sir; I was assigned an engine of the same class that I was working that day; no, I think I was working 468 at the time.

Q. And that was the same type of engine that Mr. Andrews was running?

A. Yes, sir; it came in the same class.

Q. Are you familiar with the operation of the injector on that type of engine?

A. Yes, sir; pretty familiar with them.

Q. I wish you would tell the jury what the injector depends on? I mean the working of the injector when it will throw water in the boiler and when it will not?

A. That is of engines that I have run?

Q. Yes; of that same type, and same kind of injector, if yours had the same kind.

A. I find that if they are properly primed they work all right. Of course, you can pull them a little bit too sudden and they will break, you can also have your water valve and let it run wide open, and if you start your injector working properly and if your
[426] water valve runs wide open it will get too much for the amount of steam and condense it, and therefore the injector will work improperly. You can allow that water valve to close up on you and you are getting too much steam for the amount of water you are getting, and it will cause it to work improperly.

Q. What valves does an engineer have to work in order to put the injector on and regulate it?

A. He has a steam valve and a water valve.

Q. Are they two distinct and separate valves?

A. Yes, sir; one in front of him and one by the side of him.

Q. How do you operate each one of them?

A. You open the water valve whatever amount you want to open it, as wide as you want, and when you get to that point you generally reach up and get your steam valve for a second like that (indicating) and pull it on back, that is, it depends on how much steam you have got, but you just reach up and stop it for a second and keep on back with it.

Q. Now, in working those valves and in attempting to put on steam, do you ever fail to catch water and throw it in the boiler?

A. I have.

Q. Does that occur frequently?

A. No, sir.

[427] Q. Or sometimes, or how often?

A. It occurs sometimes, it will occur frequently with one injector and again you can run that round trip or two and it won't occur.

Q. Does the operation of the injector in the first place depend on whether it is properly primed or not?

A. It certainly does, that is the experience I have had with an engine.

Q. Even after you get it in proportion with the regular steam

pressure of 185 pounds say, does it depend on keeping these valves properly adjusted to make it continue to work?

A. I just now said if you let the water valve, when starting to work, get too much water it won't work right; if you draw it right back, it won't work right it will break the injector to a certain extent.

Q. When an engine is running, pulling a train of 80 cars between Singer and the point of this accident, can you tell whether the injector is working or not by the sound of it?

A. No, sir.

Q. How can you tell?

A. My experience with that is I have to keep my eye on the business, I have to watch the water glass, and if I see it works a little sluggish for five or ten minutes I run over and blow it and if not satisfied I reach out and try the water guage.

Q. What test does he make to determine whether he has [428] got water in the boiler?

A. How does he determine whether he has got water in his boiler?

Q. Yes.

A. From experience, I have several ways.

Q. What are those several ways?

A. You can get so much in there, you can throw it out of the stack, that is a mighty poor indication.

Q. What I want to know is whether he has anything in addition to the water glass to tell whether the boiler has got water or not?

A. Yes, sir; he has three guage cocks.

Q. Which is the most certain and the most accurate way of telling whether there is water in the boiler or not?

A. The guage cocks.

Q. With the window closed, running between Singer and the point of this accident, could the engineer tell whether his injector was working properly or not?

A. I do not see how he can, unless he kept his eye on the water glass and guage cocks to see they were maintaining the required amount of water in the engine. I can tell by the singing, that is, if everything is working nice and favorably, it does that, some engines will knock and pound, and some will run along smoothly. Some injectors are brand new and they will sing for you. There is a dozen different ways I can tell from the eleven years I have been running, and I just have to use my best judgment, and I never depend on the singing of the injector as to whether it is working or not.

[429] Q. Can you or not tell by the singing of the injector with

the engine running?

A. No; I cannot tell.

Q. What kind of a place is it between Singer and the point where this accident occurred, with reference to keeping water in the boiler, is it easy or hard?

A. It depends on the working of the engine, a man doing what you call hogging an engine, it is hard; if he is running his engine smoothly, it is not a very hard place to keep water in the engine.

Q. Have you ever tried your engine to see how long it would take you running water out of the boiler when you had water within an inch of the top of your water glass when you passed Singer tank?

A. Yes, sir; I have done it just experimenting with it.

Q. When?

A. I done it here last week; I have done it three times in the last year.

Q. What result did you find?

Plaintiff objected.

By the Court:

Those tests had to be under similar conditions.

Q. Were you running the engine under working steam pressure?

A. Yes, sir.

Q. When you tried it?

A. Yes, sir.

[430] Q. Did you have the same class of engine as this one?

A. Yes, sir; the same class, No. 479.

Q. Pulling the same character of train?

A. No, sir; I was pulling a little heavier train.

Q. Each time?

A. Pulling what we call—they have raised the tonnage on us five cars. Now, I am mistaken; one time we had a regular train, and the other two times we had five cars more.

Q. The time you had the same kind of a train, I wish that you would tell the jury how long it took you to run your water down after you left Singer tank?

Plaintiff objected.

Q. What kind of a train were you pulling?

A. Equal to 85 empties then; now we are pulling what we call equal to 90.

By Mr. Staples:

How many empties were they hauling at the time of the accident?

Witness:

85.

By Mr. Staples:

How do you know?

Witness:

That was our tonnage at that time.

By Mr. Staples:

How do you know this train was run according to the regular tonnage?

Witness:

Which, 469?

By Mr. Staples:

Yes.

Witness:

I don't know that; I can't say anything about that; the train I thought you were talking about was my train.

[431] Q. That train had 80 cars, consisting of three loaded cars; I wish you would state whether or not that would be equal to 85 empty cars?

A. Was that what 469 had?

Q. Yes, sir.

A. He had 80 empties and three loads?

Q. Yes, sir.

A. That is a half a car over 85 empties; you allow two empties for one load.

Q. Go ahead and answer the question.

A. I want the jury and all to understand that I don't know anything about 469; I am telling what I done with 479. Engines vary a lot in different things; I have run 479 passing there just for an experiment in it and just to see what I could do with it with the water between one-half to one inch of the top of the glass coming along by Singer water tank, making between eighteen and twenty miles an hour, and there is a road crossing just this side of Sheriff Martin's house, and every time—I did not miss it, you might say fifty or

seventy-five yards by putting my injector on at the same
[432] place. Now, of course, I put it on there because I did not feel it was safe to dip over in that hole and keep on going. I did not run it down extremely low or anything like that; I just done it to see how much water would get out of the glass.

Q. How low did your water get?

A. To one guage.

Q. What do you mean by that?

A. That is the bottom guage cock, that allows you about three inches, I believe, is what boilermakers say, above the crown-sheet.

Q. How far is that road crossing that you speak of east of Sheriff Martin's house from the point where this explosion occurred?

A. I would say along between—I don't know whether it is hardly a mile or a little over a mile.

Q. Just about a mile?

A. Yes, sir; that is to where I have been told where the accident taken place and where I have seen indications of the cinders and things.

Q. In running an engine up that grade from Singer tank to west of where this explosion occurred, would the engineer ordinarily have two injectors on?

A. No, sir.

Q. Why wouldn't he have two injectors on?

A. The grade is not heavy enough and he does not work his engine hard enough, you might say he has to lighten up his engine to go over the Norfolk & Western viaduct, he shortens the stroke
[433] of his valve and don't use as much water or coal going fifteen or twenty miles an hour and he doesn't need both injectors.

Q. Suppose he did, what effect would it have?

A. It would kill the steam pressure back, it would knock your steam pressure back and the train would begin to drag.

Q. Is there any way that both of those injectors could get put on, that is the steam valve be pulled back and the water valve turned on without somebody doing it?

A. How is that question?

Q. I say, is there any way that an injector on the left side could have been put on, the water valve opened and the steam valve opened, properly, to make it work, without somebody operating those valves and putting them on?

A. There is no way they would get opened unless you would put them on yourself, unless you pulled that steam valve open and opened

the water valve; that is, if you are going to work the injector, there is no way to get it.

Q. Could an explosion have put them on?

A. I don't see any way that an explosion could have put them on that way, unless the steam has been exploded like that; you might come and throw that main steam turret open, the water valve turns like this (indicating), screws down, if that steam pressure came out there through the branch pipe under the chuck and hit it, it might throw it open, but when it done that it would blow the hose off.

Q. What is the custom among engineers in reference to
[434] inspecting their crown-sheets before they start out on a run?

A. They always—I can only speak for myself, I never do fool around an engine, I always go to an engine, and the first thing I do is to put on the blower and look in it.

Q. What do the rules of the Company require an engineer in that regard to do?

A. They require him to look after his crown-sheet and look after any part of the work he has reported on the previous trip, coming in, to see whether it is done or not.

Q. Are you familiar with the rules that were in force at that time?

A. Which time is that?

Q. At the time of this accident?

A. I am tolerable, I might be a little rusty on some of them.

Q. Is that a rule book that was in force at that time?

A. 1912?

Q. Yes.

A. "The Deepwater and Tidewater Railway Company". I got a rule book exactly like this one; it is what is called the standard book of rules. I think Mr. Welborn gave it to me.

Q. Was that in force at that time?

A. 1912?

Q. Yes, November the 14th, 1912?

A. If they made any change I wasn't notified.

Q. I call your attention to rule 702, under "Instructions
[435] to Enginemen". I wish you would look at that and see if that rule was in force at that time.

A. Rule 702?

Q. Yes, sir.

A. Yes, sir; that was in force at that time.

Q. I also call your attention to rule 729, and ask you whether or not that rule was in force at that time?

A. Yes, sir.

By Mr. Wingfield:

We now desire to offer those rules in evidence, and want to read them to the jury.

(Said rules, Nos. 702 and 729, are here introduced in evidence, read to the jury and are as follows:)

By Mr. Wingfield:

702, under Instructions to Engineers. The head of it is "Instructions to Enginemen". Rule 701 starts out, "Obey orders of the conductor as to starting, stopping, etc.'" and 702, is as follows:

"702. Be responsible for the proper care and safe management of the engine; the proper condition of all tools and signal appliances upon the same; the exact observance of all signals and other precautions established for the safety of trains; the avoidance of all risks, or any trouble on account of misplaced switches; the regularity of speed between stations; the charge and safety of the train, if the conductor is disabled, until properly relieved; the economical use of fuel and other supplies; the examination of bulletin boards before and after each trip; the careful and frequent inspection of the engine before, during and after each trip; the proper attachment of bell cord to cab gong or whistle before starting....."

And so forth. I will not read the rest of it unless the gentlemen want me to.

By Mr. Staples:

Does it say anything about the crown-sheet?

By Mr. Wingfield:

No, sir; it says proper inspection of the engine, before, during and after each trip. Now 729 is as follows:

"729. Report to the master mechanic any defects or improper condition of engine seen before starting with train. After each trip make a thorough inspection and report anything found not in good condition or needing repair; also state what light repairs have been made by engineer. Report in detail every injury or breakage happening to the engine while running train, or in service on the road or in yards. This report must be made before going off duty at the end of each trip."

[436] Now, does an engineer in compliance with those rules make an inspection before going off the engine?

A. Yes, sir.

Q. He also makes an inspection before starting out with it?

A. Yes, sir.

Q. Mr. Walton said that the injectors on this engine were inside the cab and the pipe leading from the injector to the boiler was inside the cab. What do you say about that?

A. I say they must have changed it from the last time I seen it, all the rest of them.

Q. Where have they always been?

A. Right between the engine and tank; they have a non-lifting injector on that engine.

Q. On the outside of the cab?

[437] A. Yes, sir; on the outside of the cab.

CROSS-EXAMINATION.

By Mr. Staples:

Q. Where are the valves which the engineer handles to control that injector? Are they on the inside or outside of the cab?

A. On the inside.

Q. Engineers do not have to go outside of the cab to handle that injector at all, do they?

A. No, sir.

Q. Suppose an engine leaves Roanoke City with one injector on and the water glass shows a steady increase of water up to the point of Singer tank, and the injector not changed from there to the point of this accident, which is, I understand, about between two and three miles from Singer tank. Would you say that one injector was sufficient to throw enough water in there, with that load you have described, of 80 cars, or not?

A. The only way I can answer this question is according to my own experiments with them.

Q. Don't you know, generally speaking, whether that is true?

A. Yes, sir.

Q. Tell the jury whether that is a fact?

A. If I got an injector and I passed Singer tank and it is working and has increased in water, has gained water in that boiler from Roanoke to Singer, when I hit Singer water tank, and

[438] it has got more water in it at that time than he had when I came by Salem and the injector had never been shut off, it is an evident fact that the injector is in first-class shape and throwing plenty of water.

Q. And you rely on that one injector, don't you?

A. I do not only rely on the injector, but I also watch my water level.

Q. You watch the glass?

A. Yes, sir.

Q. That is put there for the engineer to watch, isn't it?

A. Yes, sir.

Q. If the glass showed again from Roanoke to Singer tank, puts it to that point with that same load on, is there any reason in the world why that same condition undisturbed should not carry that train on if the crown-sheet and bolts were in proper condition? If it is, tell the jury.

A. If which?

Q. Read the question.

(Question is here read to the witness.)

Q. Can you see any reason in the world why it should not?

A. The fact that the injector wasn't disturbed and nothing in the world done to the injector, you say?

Q. Yes, sir.

A. And nothing got stopped up about it?

Q. Nothing.

A. Everything working in perfect shape?

[439] Q. Yes, sir.

A. And the crown bolts in first-class shape and the crown-sheet in first-class shape?

Q. Yes, sir.

A. If you have all that stuff it takes it right into Princeton; I do not see why it should not do it.

Q. If the crown-sheet or bolts are defective, that brings about a different condition?

A. Yes, sir; it does.

Q. If the injector gets stopped up, when you get that same steam turned on it, from Roanoke to Singer tank, that is something the engineer cannot control?

A. How is that?

Q. If the injector gets stopped up for any reason in running from Roanoke to Singer tank, showing that increase of water, that is something the engineer cannot control, if it does get stopped up?

A. He cannot control it while the engine is moving, he can stop and control it.

Q. He couldn't control it while the engine is going, at least?

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A. No, sir; he can control the supply of that water while the engine is working.

Q. I don't mean that, but I mean if something gets wrong with the injector which supplies the flow of water, his water glass would have told him, wouldn't it?

A. His water glass or injector, one or the other will tell [440] him, then he has got to stop.

Q. He would not be told from the injector itself, would he?

A. I don't reckon he would, at least I wouldn't, at least I never have, I wouldn't say I wouldn't, but I never have.

Q. You don't think you would be told by the injector itself, would you?

A. I don't see why I would.

Q. In these experiments which you made, you did not go along there and let your water get down below the crown-sheet, did you?

A. No, sir; I just done it; just jogging along there, just to see what I could do and how far I could run it, when I thought it was safe to put the water back in the boiler, I wasn't going to let it run to an unsafe point.

Q. How long did it run you under the experiment you made, in minutes?

A. I didn't experiment in minutes. I kept my eye on that water, I was looking at the water.

Q. How long did it run you in miles?

A. Two or two and a half miles, somewhere along that neighborhood, I just went along there and everything was working nice and smooth and it just popped into my mind, I will just give you a trial, and I just shut the injector off and said nothing to any body and went on. The fireman looked around at me, and I would look around like that, and I wouldn't say anything to anybody, I have said more here than anywhere else about it.

Q. If the left injector was put on by the engineer, do you think the fireman would know it or not?

A. I tell you from my standpoint, the way I handle them, it depends, there is one or two things, if I have got a new fireman that knows nothing about the injector, I don't say anything to him, I step over there and tell him to step out of the way.

Q. He knows what you are doing?

A. You mean do all firemen know?

Q. Yes, anybody would.

A. Yes, sir; he knows when I put that left injector on.

Q. He is bound to?

A. He looks at you first and then the injector, and then the steam guage.

Q. You don't think it is possible for an engineer to put on the left injector without the fireman knowing it?

A. I cannot say about that, it depends how the fireman is situated in the cab.

Q. You cannot hardly see how he could?

A. He might be up on his knees or on the gangway and I can walk over there and test it like that and he know nothing about it.

Q. But if the fireman is in his place, do you think it is possible to do that?

A. He would have to get his feet out of the way because
[442] the water valve is right there; he sits here (indicating), the water valve is there (indicating), and you have got to move something to get to the water valve.

Q. And the fireman has got to move?

A. Yes, sir.

Q. With the brakeman sitting with the fireman, both on the same seat, do you think it is a physical possibility for the engineer to put on that left injector without the fireman knowing something about it?

A. I don't see how it would if he had his mind on his business at all.

Q. Are these injectors anyways complicated or can any engineer work them?

A. Any engineer can work them that calls himself an engineman.

Q. A man who could not work his injector would hardly hold his job on the railroad?

A. He wouldn't not only hold his job but he wouldn't get out of the yard if he couldn't work the injector.

Q. If he couldn't work the injector he couldn't get out of the yard?

A. No, sir.

Q. I believe you told us you relied on the water glass if everything was going along smoothly and nice, you looked at the water glass, and if the water glass got sluggish and showed any dropping down, you begin to test your chuck?

A. Yes, sir.

Q. That is the ordinary custom and practice among

[443] engineers?

A. Yes, sir; I might say, every hour or two, it is the practice, it is at least with me.

Q. Mr. Hall asked you how hard it was to keep water in the engine at this point. Is it any harder to keep the water in the engine at this point than it is at any other point along the road on the same grade?

A. That depends how you are working your engine.

Q. Let's assume your engine and everything is going nice, is it hard to keep water in there at all?

A. If the engine is working nice and properly, everything working smoothly along there, it is not hard.

Q. There is nothing difficult at all about it?

A. It is not hard to keep water along there with one of these Sellers' injectors.

Q. It is not any harder there than any other point along the road, is it?

A. No, sir; I do not believe it is, unless you hog your engine. I can hog an engine through that dip and knock the water out of it in a little bit.

Q. What is that?

A. Dropping in the corner and widening on them and make them growl a little bit louder, that is changing the stroke of your engine, what I call work the back pressure,; that is, if you do not throttle here right, dropping your reverse lever down, and giving her more steam, that is what I call it.

[444] Q. That is not fair to the engine to hog her?

A. No, sir; not exactly fair to hog her.

Q. In the first place, how many time will your tank fill your boiler?

A. You done got way up yonder now, I think there is 12,000 gallons of water in one of the tanks and 15,000 in the boiler.

Q. 15,000 in the boiler?

A. 1500, I should have said.

Q. Isn't it true your tank fills your boiler twice?

A. No; if mine did not fill it any more than that I wouldn't have any water at all; I don't know how much water it takes to fill one of them boilers.

Q. The boiler I have been informed holds something about four or five thousand gallons all told, is that about right?

A. I don't know, I never measured the water in it.

Q. If it is true that the tank will fill the boiler only about two or three times and you could consume a boiler of water in a two-mile run, they would have these tanks along the track about every five or six miles, wouldn't they?

A. If you consumed all the water you may say, from out the front end, all along among the flues and off the crown-sheet, you would have to have 85 empties to haul the water before you could get from one side of the track to the other.

[445] Q. If you can practically consume the water in your boiler over the crown-sheet in a couple of miles you sure would have to have your tanks along up the road a heap closer than they are now, wouldn't you?

A. To use it all off the crown-sheet?

Q. Yes, sir.

A. I never used it all off, I don't know how much you got to go below that bottom guage cock, I presume that is about the larger part of the crown-sheet from the guage cock down, because it comes up like that (indicating).

Q. If that was true, if you could consume practically the water over the crown-sheet in two miles, how close do you figure they would have to have the tanks along the right-of-way?

A. If I consumed the water over the crown-sheet—I never consumed no water over that crown-sheet—you want me to have a burned engine here shortly.

Q. Do all engines of that class consume the same amount of water?

A. No, sir; some engines will use more water than others.

Re-Examination.

By Mr. Hall:

Q. If the fireman and the brakeman were both on the left side and the engineer wanted to put on his left injector, would he have to get one out of the way?

A. That depends how they were sitting. If the fireman were sitting down—say, there is the seat box and he was sitting like this and the front brakeman was sitting like this (indicating), here is some room, here is the water valve, and if that fireman was sitting like that he has got to move his seat, if he is like that, with [446] his head out of the window that way (indicating), I could go to that injector and put it on and he never notice it. If he is standing in the gangway like that (indicating), I could get to that injector and put it on if he is an inexperienced man, but if he

is an experienced man and knows his business it is pretty hard to do it.

Q. If he had his feet on the box with his head hanging out of the window, you can put it on and he not know it?

A. Yes, sir.

Q. Where does the front brakeman ride?

A. He generally always rides in front of the fireman on the front seat box, with his feet like that.

Q. He doesn't stay on the engineer's side, does he?

A. There is no room over there for him.

Q. Now, which do you rely on to determine the water in your boiler, the water glass or the guage cocks?

A. I rely on my guage cocks.

Q. Why?

A. It is the more safe plan to tell when you have got water. I can take a water glass at night, I have run engines with the light out, and you could not see the water glass, but I can tell by the sound whether I am getting water in it.

Q. You can open that and tell always?

[447] A. That is the most up-to-date mechanical idea ever I seen to tell water.

Q. If you are running at night and you haven't got a light in your engine, is it easy to see whether you have got water in your water glass or not?

A. If you have got no light you cannot see it.

Q. Suppose you don't have a good light there?

A. A good light, it don't take a very good light there for the water glass, the water glass ain't more than that long (indicating). It depends how you got the light on the glass or in the cab whether it is going to do you any good or not, if you have got it turned around like that where it don't reflect on the water glass, it is no good, but if you have got it reflecting on the water glass, it will make light enough to see water in the glass.

Q. Which way does this water guage face, the flat side of it, where you look in and see whether there is water in it or not?

A. The way that they face on them engines over there is, take an engineman, he is sitting about in this position (indicating), as lazy as you can get him in; that flat part of the water glass is facing him like that (indicating), and all he has got to do is to throw his head that way and look at it like that (indicating).

Q. When it is set that way, does it face the fireman, when he is firing?

A. No, sir; he is back here firing (indicating), the
[448] water glass sets like that, and here is your door and here is your engineer, he has got that water glass facing him, and the fireman is down here (indicating).

Q. And you can only see the water in that glass by looking at the flat side, can you?

A. That is the only way I could see it.

Q. And is that the side that faces the engineer?

A. Yes, sir.

Q. I wish you would look at that and see if that is the kind of water glass that is on those engines?

A. Yes, sir.

Q. Hold that up and show the jury how it faces the engineer.

A. Take it this way (indicating), say we are going west, that water glass sets back on that side of them big boilers, this is my seat right here and this sets on the boiler just in that shape, you can turn it just a little bit, an engineer generally has it turned so he can see like that, and he looks out of the window that way and if this water glass is turned too far back that way, it will be shaded, if it is turned a little too much towards the boiler, you have got to lean over this way to see it.

Q. If it happened to be turned so that the fireman could watch it every time he fired, would the engineer be able to see it without turning his head or changing his position?

A. No, sir; he would have to be sitting kinder in this
[449] shape, this way (indicating), the fireman is down here. If he is going to look at it this way, he would have to be sitting more this way, more out towards the cab of the window.

Q. If it was setting so that the fireman could look at it every time he threw coal into the fire box, what position would the engineer have to get in, in order to see it?

A. Back like this (indicating).

Q. He would have to raise all the way up as you have indicated and look back?

A. Yes, sir; I always keep it like this (indicating), so I don't have to turn round.

RE-CROSS EXAMINATION.

By Mr. Hunt:

Q. What is that you told us about a little experiment and about what your fireman did?

A. That was a little stunt I pulled off about Singer tank.

Q. What did your fireman do?

A. He would throw a little coal like that and look at me; he didn't look at the glass that way.

Q. How did he do?

A. Here is his position(indicating). The fireman was in this position, say this was the boiler and there is the water glass, and here is the engineer on this side, the water glass facing the [450] engineer, there is your fire door, and he was throwing coal like that.

Q. Just show what the fireman did.

A. He did just like that (indicating).

Q. Is that the way he looked?

A. Yes, sir.

Q. There was no trouble in seeing it if he does that?

A. He has got to turn around that way and see it.

Q. It is not the intention of the railroad company to hide the water glass from the fireman, is it?

A. No, sir.

Q. There is no trouble about their seeing?

A. No, sir; and mighty near all of them watch it, too, don't you forget it.

Q. You don't know how the water glass was setting on this particular engine?

A. No, sir; not on 469.

(Witness stands aside.)

[451] A. G. HOUSTON.

A. G. Houston, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Wingfield:

Q. What position do you hold with the Virginian Railway Company and what position did you hold in November, 1912?

A. Railroad foreman of engines.

Q. And you still hold that position?

A. Yes, sir.

Q. How long had you been acting in that capacity at that time?

A. About a year and four months.

Q. What experience did you have as to the use and construc-

tion of engines previous to your becoming road foreman of engines?

A. I started working in the roundhouse in the fall of 1898, and went from there on to the road firing and fired about six years in all, and then after firing I was running up to the time I was promoted to road foreman.

Q. What year did you begin firing?

A. 1899.

Q. And you were an engineer when?

A. 1903.

Q. Did you go to the point of the accident for the purpose of taking this engine to Princeton?

A. Yes, sir; not to the point of accident, but to Fagg.

Q. Did you take charge of the engine?

A. Yes, sir.

Q. Did you carry it on to Princeton?

A. Yes, sir.

Q. Was the engine preserved in the same condition in [452] which it was when it was turned over to you at Fagg?

A. Yes, sir.

Q. What did you do with the engine when you got to Princeton?

A. I left it in charge of workmen there, who were putting canvas over the entrance to keep anybody from getting in there.

Q. Did you see that done?

A. Yes, sir.

Q. Did the engine remain in that same condition until the Interstate Commerce Inspectors came to look at it?

A. The next morning they took the canvas off and boarded it up.

Q. Did the engine itself remain in the same condition until it was examined by the Interstate Commerce Inspectors?

A. I think it did; I did not stay right there all the time, but as far as I know, there was nothing removed from it or anything done to it at all.

Q. Did you examine the injectors on this engine when you took charge of it?

A. No, sir; not particularly so.

Q. Did you examine them later?

A. I did when the Inspectors were there and we were testing them on another engine.

Q. What was the condition of the injectors at that time?

[453] A. Good.

Q. Is one injector ordinarily sufficient to keep enough water in the boiler?

A. Yes, sir.

Q. Under what circumstances does an engineer use two injectors?

A. When the water gets low he generally puts the other one on to regain it a little.

Q. Does your experience in running over the line between Singer and the point of accident and between Roanoke and the point of accident enable you to state about how fast an engine of this class, No. 469, will use water out of the boiler?

A. They would use from Roanoke to the point of the accident ordinarily—

Q. (Interposing.) I mean how rapidly will it use water out of the boiler. I mean by that can you tell how long it would take if you had a boiler with enough water in it to show within an inch of the top of the guage, how long it would take you under ordinary conditions, not putting any more water in the boiler, to work that water out of the engine so that the crown-sheet would be exposed?

A. You would probably go about a mile, between a mile and a mile and a half.

[454] Q. Have you had sufficient experience in running engines over that portion of the road to enable you to tell about that?

A. Yes, sir.

Q. What experience have you had in connection with handling engines other than what you have already told us?

A. When these engines came here they were all new, and that was part of my duty to ride them and get them working properly and I expect I averaged two trips a week down to Roanoke and back.

Q. And on these trips did you examine the performance of the engines with reference to their—

Q. On these trips that you were making back and forth on these particular engines, did you, or not, observe their performance with respect to the amount of water they consumed among other things?

A. Yes, sir.

Q. Did you run the engines yourself?

[455] A. Part of the time I did.

Objection overruled. Plaintiff excepted.

Q. Does the operation of these injectors depend to any extent

upon the manner in which they are put on?

A. Somewhat, yes, sir.

Q. If the injector is not put on properly, will it carry water into the boiler?

A. No, sir.

Q. What is the practice of engineers as to the inspection of their crown-sheets when they start out on their runs?

A. I have noticed most of them that about the first thing they do when they get on the engine after being called is to look at the crown-sheet.

Q. Can he tell anything about his crown-sheet by looking at it in that way?

A. Yes, sir; he can tell whether it is leaking or not.

Q. Can he see the sheet itself?

A. Yes, sir.

Q. Do you require them to do that?

A. Yes, sir.

Q. Did you examine the boiler of this engine after it was taken to Princeton?

A. Yes, sir.

Q. What did you find?

[456] A. I found that the crown-sheet was bagged down up towards the front end and that the grates, most of them were blown down into the ash pan.

Q. Did you examine the inside of the boiler?

A. No, sir.

Q. You simply examined the outside of the boiler?

A. Inside the fire box.

Q. What was the color of the iron of the crown-sheet?

A. I did not pay any particular attention to that at all, I was not called in as an inspector, I was just simply there to—

Q. (Interposing.) What was the condition of the water glass on engine 469?

A. It showed all right when we tested it on other engines.

Q. And the water guages?

A. They were all right.

Q. In the operation of an engine, is it safe to rely entirely on the water glass to indicate the level of your water in the boiler?

A. No, sir.

Q. What is the most accurate instrument there for measuring the quantity of water in the boiler?

A. The guage cocks.

Q. Why not the water glass?

A. It is apt to get stopped up and show a false level.

Q. If the water glass should happen to get stopped up,
[457] is there any means provided by which an engineer can open it up on the trip?

A. Yes, sir.

Q. What is that?

A. There is a little blow-off cock underneath the water glass.

Q. Who has charge of that water glass while the engine is being run?

A. The engineer.

Q. Does anybody else have charge of it?

A. No, sir.

Q. And I believe you stated there are means at hand for his clearing it out if it should get stopped up?

A. Yes, sir.

Q. Can he tell when it gets stopped up?

A. Yes, sir.

CROSS-EXAMINATION.

By Mr. Staples:

Q. How much water ought to be used out of that tank from Roanoke to the point of this accident?

A. About 6000 gallons.

Q. What is the capacity of the tank?

A. 12,000.

[458] Q. In other words, you think about one-half of the tank ought to have been used up from Roanoke to the point of the accident if it had been full when it left Roanoke?

A. Yes, sir.

Q. That is in accordance with your usual experience, is it?

A. Yes, sir.

Q. Did you measure the water in the tank when you got it to Princeton?

A. No, sir; I did not.

Q. Do you know what it showed?

A. No, sir.

Q. Did you see it measured?

A. No, sir; I do not think I did.

Q. What damage was done to the inside of the engine
[459] there as to the wagon top?

A. There was none done to the wagon top.

Q. No damage at all done to that part up there?

A. No, sir.

Q. It didn't look like any violent burst, did it?

A. Only down at the crown-sheet.

Q. You say that you ran an engine with the water about an inch from the top of the water glass and used it up in about a mile?

A. Something like that, I think that would be about right, perhaps it might go a little further, and in some cases a little less.

Q. Do you know anything about the capacity of that boiler?

A. No, sir.

Q. You are not familiar with that?

A. No, sir.

Q. You don't know the number of gallons it holds?

A. No, sir.

Q. You don't know the capacity of the injector, do you?

A. About—their maximum capacity is about 7000 gallons an hour.

Q. 7000 gallons an hour?

A. I think so.

Q. Is that one injector or both?

A. One.

[460] Q. What condition were the grate bars in?

A. Some of them were down in the ash pan, clean down into the bottom of the ash pan, and some of them, one of them, was laying on the outside of the rest, and some of them were broken down, part way.

Q. What kind of condition was the stoker hole in?

A. The caps were blown off of them.

Q. Of all of them?

A. I think so, but I am not sure about that.

(Witness stands aside.)

[461] E. C. GRISSOM.

E. C. Grissom, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. Were do you live?

A. Princeton.

Q. What do you do?

A. I run a garage.

Q. Were you ever employed at Princeton by the Virginian Railway Company?

A. Yes, sir.

Q. In what capacity?

A. As a machinist.

Q. Were you working for the Virginian at the time this engine 409 was blown up?

A. Yes, sir.

Q. Did you make any inspection or any examination of the parts of that engine after it was brought into the shop at Princeton?

A. Yes, sir.

Q. What parts of it did you examine?

A. I tested the steam guage in the presence of the Interstate Commerce Inspectors; I tested the cocks, both high and low pressure; I tested both injectors at intervals during the time the steam was coming up. I taken the injectors off and handed them to the Interstate Commerce Inspectors, the water columns, both valves, top and bottom.

[462] Q. How did the injectors and the steam guage and the water cocks that you tested show up?

A. They tested all right, the injectors picked up a part of the water valves at sixty pounds, a little more at one hundred pounds, and filled the water valves at 180.

Q. How did the steam guage test?

A. Right to the very ounce, 185 pounds, it tested up to 250 pounds right to the line, 20 pounds at a time after 15 pounds.

Q. Did you see the Interstate Inspectors test the water glass and the water cocks?

A. They blowed through them when I took them off and handed them to them.

Q. How did they test?

A. All right, they said, and they sounded to me like they were all right, too.

No cross-examination.

(Witness stands aside.)

[463] C. L. RICHARDSON, RECALLED.

C. L. Richardson, recalled, for defendant:

Further cross-examination by Mr. Hunt:

Q. I want to ask you one question which I forgot to ask you while you were on the witness stand. Mr. Richardson, is it possible for an engineer to go up to his engine with a fire in it sufficient to run it, and inspect the crown-sheet, and determine whether that crown-sheet has ever been scorched previously? Is that possible?

A. You want me to answer this question in regards to the experience I have had in running locomotives and inspecting crown-sheets?

Q. Yes, sir.

A. I can not.

Q. You can not do it?

A. I can not; I have looked in these things and I cannot tell when they are burned; but I can tell if they are leaking, but I cannot tell when they are burned.

RE-EXAMINATION.

By Mr. Hall:

Q. Can you tell whether they are leaking?

A. Yes, sir.

Q. Suppose a crown-sheet was bagged down, pocketed down between the stay-bolts, you could tell that, couldn't you?

A. I never seen one pocketed.

[464] Q. You have seen that one, haven't you (indicating crown-sheet in the court room)?

A. Yes, sir; but I have never seen one in a locomotive that was alive, pocketed.

Q. You never did?

A. No, sir.

Q. Why didn't you?

A. I never did find one.

Q. Have you looked to see if you could see them?

A. Yes, sir; I have gone to a chain gang engine and I have put the blower on and found anywhere from two to three to four crown-bolts leaking, and then I make my report of it to the road foreman of engines, or to the roundhouse foreman, and I say, engine so and so has got three or four crown-bolts leaking, don't forget, I did not burn that engine.

Q. That engine wasn't pocketed?

A. I couldn't tell you.

Q. If the crown-sheet was pocketed as bad as that one is, could you look in the fire box and see if it was pocketed?

A. If it was bagged down like that I would begin to run.

RE-CROSS EXAMINATION.

By Mr. Hunt:

Q. If it was pocketed like it is in this corner could you tell it where it is not blown down?

A. I have never looked at that thing right good.

[465] Q. Step over to that corner and look at it; I mean this corner, not where it is bagged down. Those little pockets here, could you look in the fire box with a hot fire in it and see those?

A. If that crown-sheet was like this one, I cannot do it, I never have found one.

By Mr. Hall:

Q. You could find the leak all right?

A. Yes, sir; in the dark, mighty near.

Q. When they are scorched or burned they will leak, when you cannot find any pockets?

A. The ones I have seen in my experience in railroading that was burned, they claimed was burned, I have had them with three or four crown-bolts leaking in them, and thirty-five or forty, and you just hear them say that engine has been scorched, but I never saw any pockets in them, but I could see that water flowing out of there.

Q. When you have got a steam pressure of 185 pounds on it, does that force the water out of it so you can see it without trouble?

A. The experience I have had in regard to burned crown-sheets, if you get on an engine when the steam pressure is low on it, the leaks will show up worse in the crown-sheet, and if the crown-sheet is cooled to a certain extent, just as soon as you put a hot fire in that engine and it is popping off, that iron will expand and stop them leaks to a certain extent, that is the experience I have had in my

[466] eleven years experience with burned crown-sheets.

Q. But you can still see it leaking up there?

A. I have seen thirty-five or forty crown-bolts in a boiler leaking with 135 pounds of steam pressure on, and just as soon as you get that engine around to the maximum pressure of 150 or 160 or 180 and get that fire box good and hot, they will all dry up, but one or two sometimes.

(Witness stands aside.)

[467] R. H. SCOTT, RECALLED.

R. H. Scott, recalled, for defendant:

Further cross-examination by Mr. Staples:

Q. Mr. Scott, when that accident happened and the train stopped, what did you do then?

A. I went over to where I found the men.

Q. How long do you reckon it was after the engine blowed down before the train stopped, how long did it drift?

A. Not over a couple of minutes, a minute probably; but I don't know what time the engine blowed down.

Q. Then you walked up the track until you came to where Jerre Walton was?

A. Yes, sir.

Q. He was the first one you came to from the cab, wasn't he?

A. Yes, sir.

Q. And then how far was it beyond him that you came to the engineer, Mr. Andrews?

A. Four or five cars.

Q. What did you do after you talked to Mr. Walton and administered to the men awhile, then you went back to the cab, didn't you?

A. I went back to the cab and got my bed clothing and took them over there and covered them up the best I could.

Q. How long do you reckon it was from the time the accident happened until Mr. Thomas got there? About an hour, do you reckon?

A. I guess it was, for I had to walk two miles.

[468] Q. And telegraph?

A. Yes, sir; telephone.

Q. And then he had to come there?

A. Yes, sir.

Q. It must have been at least an hour, wasn't it?

A. I suppose it was; the very best that could have been done.

Q. Which was the furthest west, Mr. Andrews or the brakeman?

A. I couldn't say, because they were pretty close together, one on one side of the train and one on the other.

Q. Just about even, weren't they?

A. About even; yes, sir.

Q. And the brakeman was on the opposite side of the train from where he had been sitting, according to Mr. Walton, when the crown-sheet failed, he was on the right side, wasn't he, when you found him?

A. Mr. Walton said he was sitting on his side of the engine, which would be the left side.

Q. And you found him on the right side?

A. Yes, sir.

Q. And the engineer was supposed to be sitting on the right side and you found him on the left side?

A. Yes, sir.

(Witness stands aside.)

[469] S. H. LEWIS.

S. H. Lewis, sworn, for defendant:

DIRECT EXAMINATION.

By Mr. Hall:

Q. What is your profession?

A. I have been railroading for about 25 years, following the mechanical department end of it.

Q. What position have you held in connection with the mechanical department?

A. I have been a machinist and foreman, master mechanic and assistant superintendent of motive power.

Q. Were you educated as a mechanical engineer?

A. Not entirely; no, sir. I did not finish the course as a mechanical engineer.

Q. Did you serve your apprenticeship as a machinist?

A. Yes, sir.

Q. And then you were a master mechanic?

A. I was a foreman first and then master mechanic and assistant superintendent of motive power, the last position I held.

Q. What kind of work are you doing now?

A. Railway supply business.

Q. You are not employed by any railroad now, are you?

A. No, sir.

Q. What railroads have you worked for?

A. I suppose about twelve or thirteen.

Q. Mention some of them, mention the principal railroads.

A. The C. & O, the Seabord Air Line, Virginian Railway, Chicago, Rock Island & Pacific, Sante Fe, Mexican Central, Kansas City, Pittsburgh and Gulf.

Q. What railroad were you working for when you were [470] foreman?

A. I was with the Seaboard as foreman, when I left there I went to the Virginian as master mechanic.

Q. How long did you serve as master mechanic for the Virginian?

A. Four years.

Q. How long did you serve as assistant superintendent of motive power for the Virginian?

A. Two years.

Q. When did you quit working for the Virginian?

A. The first of May, 1913.

Q. Now, in your experience in those various positions, did you become familiar with boilers and burned crown-sheets and things of that kind?

A. Yes, sir; I had some experience along that line. We had several engines burned while I was with the Virginian Railroad; the first one on there was on the East End, No. 302; that pocketed, but not as large as that, but it had quite a large pocket.

Q. Did it explode and blow down?

A. It blew down; it pocketed, I suppose, about two feet long.

Q. Did you have an opportunity of observing burned or scorched crown-sheets while you were with the Seaboard and these other railroads you have mentioned?

[471] A. I don't know as I saw so many with the other railroads as I did with the Virginian; there was more engines burned on the Virginian while I was there than on any other railroad; I cannot say that more burned there, but I saw more.

Q. Were you more directly in charge of that class of work at that time?

A. Yes, sir.

Q. How do you tell when a crown-sheet is burned?

A. It can be burned in different ways; sometimes they get scorched a little without pocketing, the crown-sheet bolts will leak, that is, in the highest part of the crown-sheet, the part that becomes exposed first, and as a general thing the flue-sheet will open up where it has been corked against the crown-sheet right at the highest point, that is one of the best indications, I believe, to show that the water has been off the sheet.

Q. If the sheet is burned to the extent this one is, and one witness has said from three and a quarter to three and a half feet wide and four and a half feet long over that space, and there is pocketing between each one of the stay-bolts, how would you tell that sheet was burned if the engine was in service and had steam pressure on it?

A. According to my experience the bolts would have leaked so bad that you would have told when the engine came in, if she had been on the road, and it sometimes, as I said, leaks without pocketing.

Q. But when they pocket they always leak. Can a crown-
[472] sheet be burned with water on top of it?

A. It could if the water was kept a sufficient distance away from it, but if the water was in contact with the sheet it would not.

Q. Did you inspect this sheet after the failure?

A. I went into the fire box at the time the Government inspectors came there to inspect it.

Q. What were the indications then on the sheet that it had been burned?

A. The shape of it, being blown down, would indicate that the water was off it and that the pressure was on top and that after the sheet got hot and soft there was impressions of the bolt heads in the sheet, showing that the sheet must have been forced down pretty hard on those bolt heads before the heads came off, making an impression in the sheet; there was pocketing between the bolts, and I believe I mentioned the color of the sheet would indicate it.

Q. How about the shape of the bolt heads that you found in the fire box, what did they indicate?

A. The first bolt-head I picked up was on the flare of the ash pan; before I got on the engine I saw one laying in the extension of the ash pan side, it was of a blue color, same as the color of the sheet, and it had been burned back down, rolled down on the face of it, that goes up against the sheet, cuts over.

Q. Could the bolt-head have been put in that shape and
[473] could those marks have been made, under that bolt head, the indentations on the crown-sheet, when it was cold?

A. It would have had to have had awful pressure, I suppose, if it had been hit a hammer blow or something like that, it would have left an impression.

Q. My question means this, under 185 pounds of pressure to the square inch, would it be possible to force those bolt-heads in the shape that they are in when they are cold, that is, with water on the top of the sheet?

A. No, sir; I was going to say if that could be done it would go on every day, because you have got that condition with water on top of the crown-sheet and with 185 pounds of steam, and you do not find the heads are being burned over.

Q. Does it increase the pressure any on the bolt-heads for an

explosion of that kind to occur?

A. Does it increase the pressure on the bolt-heads?

Q. Yes, sir; does it make the pressure any greater?

A. No; the pressure is no greater at the time the explosion occurs, that is, if it is due to the sheet becoming hot; there might be other causes that would increase the pressure if the safety valves are not right.

Q. What I mean is this: Suppose you have a crown-sheet with water on top of it, and the bolt-heads in their normal shape, and for some cause or other the bolt-heads give way and they drop off and fall down, under those conditions, with water on top of it, would [474] that pressure of 185 pounds be sufficient in the explosion or falling down of the sheet to force the bolt-heads in the shape that these are in?

A. I do not understand that question. You said if the bolt-heads had dropped off?

Q. If they are forced off or broken off.

A. I wish you would repeat that question, I do not think I understand it.

Q. The question I want to ask this witness is this, whether or not these bolt-heads, shaped as they are, with a square [475] surface on the top side of them, could be forced in that shape cold, that is, with water on the top of the crown-sheet at the time the sheet went down?

A. That head would not come off under that condition at all.

Q. Just suppose for the sake of argument that it could come off, under that condition, could it, for the sake of the question, and assume what Professor Randolph said, as we understood him to be correct, that it could come off, could it force the bolt-head in that shape?

A. Not in my opinion, I do not think it would ever bend that bolt over cold like that(it might burr up the edge around, but not bend the bolts as it is there.

Q. You mentioned certain indentations or marks on the crown-sheet around the holes, showing that the bolt-heads had been forced into the crown-sheet, could those impressions on the crown-[476] sheet have been made when the crown-sheet had water on top of it?

A. That is, the sheet cold?

Q. Yes, sir.

A. Not with an evenly exerted pressure it wouldn't, just forced down.

Q. Could it have been done under any conditions with 185 pounds pressure on it when it was cold?

A. No, sir.

Q. Some question has been asked here about the amount of water that was in that tank, do you know how much water was in the tank when the tank arrived at Princeton?

A. We did not measure it when it came in, we measured it later. The engine was brought in and put on the side track with the tank coupled up to it, and the following day the Government inspectors came and we measured the water in the tank in their presence, and it was twenty-nine inches.

Q. Do you know how many gallons of water that was?

A. It was a 12,000 tank, and I imagine it is five feet in depth—no, I wouldn't say how much it was without figuring it up, because the tank was an irregular shape. I don't know just how many gallons that would be.

Q. What was the date of that inspection that the Interstate Commerce inspectors made?

A. I couldn't say; I have not a record of it.

[477] Q. Was it just a few days after the accident?

A. I was away from Princeton the night or at the time the engine was brought in. I got back the following day and I think the Interstate inspector came in that same day, and it was in the afternoon that we got into the fire box.

Q. When you made that inspection that day in the presence of the Interstate Commerce inspectors, or when they made the inspection, did you see the injectors tested?

A. Yes, sir.

Q. How did they work?

A. They worked very well. We put them on another engine of the same class just coming out of the shop, No. 468, I think was the number, and after he got steam on that engine we tried these injectors, that is, we exchanged injectors off the 468 and put the 469 injectors on that engine, and when she got up steam we worked it at various steam pressures. I have forgotten just how they run, but I think it was 100 pounds we tried them first, and up to the maximum, 185, and they worked perfectly.

Q. What condition was the water glass found in?

A. The water glass was found to be in good condition and the valves were open; you could blow through them; we took the glass off and the pipe off and blowed through them.

Q. How about the water cocks?

A. The guage cocks, they were not stopped up.

Q. Did you examine the stay-bolts that were left in the engine?

A. I wasn't inside the boiler; I saw them from the fire
[478] box through these holes in the crown-sheet.

Q. Where were they broken?

A. They were broken right under the head of that bolt and left hanging to the shell of the boiler.

Q. Were any of them broken anywhere else except right under the head of the bolt?

A. I didn't see any that were broken any other place. I cannot say I saw them all; I saw a large number of them just looking up through the holes, they were hanging down; but I never did get inside the boiler.

Q. Now, you spoke of the color of this crown-sheet indicating at that time that it had been burned. What color was it?

A. It was a bluish color.

Q. And what was the color of the bolt-heads and bolts on the ends of them?

A. They were the same color. These bolt-heads are the bolt-heads that came off these bolts and we found on the surface they were an iron color, and when they came up they were blue, the same as the sheet, which we took came from heat; they were heated and burned that color.

Q. Was there any line of demarcation showing to what extent the sheet had been burned there?

A. Yes, sir; you could see the color line.

Q. Was it distinct?

A. Very distinct; yes, sir.

Q. Was it more distinct than it is now?

[479] A. I think it was; it seems to be faded a little.

Q. Why is that?

A. Why is what?

Q. Why was it more distinct then than now?

A. I don't know just what chemical action has taken place; there is rust there, I imagine, to some extent. If it had been put in a damp place the color would have been obliterated before this.

Q. To what extent did that sheet have to be handled in order to get it out of the engine?

A. They had to cut some of the rivets off from the front of the flue-sheet around the flange and probably on the side back, there, a few bolts had to be cut off, that were not broken, and then it had to be chipped out of the fire box.

Q. You mean you had to cut it out with a chisel, that section of it?

A. Yes, sir.

Q. In doing that and the men working over it or around it, would that have any effect on the color line and obliterating them, or help to?

A. No, sir; that wouldn't necessarily do so; they wouldn't necessarily have come in contact with the sheet on the bottom side, that is, on the fire side.

Q. Were they doing that from the top?

A. They cut it, I think, from the fire side, from the appearance of it.

[480] Q. Would the handling of the sheet, the shipping it around and handling it around in that shape, would that have any effect on the color line?

A. As soon as that sheet was removed from the boiler I had it taken up to the second floor of the office building and wrapped it up in heavy wrapping paper and tied it up so as to keep it as near its natural condition at that time as possible.

Q. The sheet was handled and shipped down to Roanoke in February of this year, wasn't it?

A. I saw it in the court room down there; yes, sir.

Q. Did you measure the surface of that sheet that showed that it had been burned by having pockets between the bolt holes?

A. How do you mean?

Q. Did you measure the surface of the sheet that indicated that it had been burned by pockets being between the bolt holes?

A. No, sir ;I didn't measure it.

Q. You know how large a surface it is, you have looked at it to see that?

A. About, yes, sir; approximately.

Q. Could a crown-sheet be burned over that area and pocketed between the bolts to the extent that one is without leaking?

A. Not according to my experience. As I say, they will leak sometimes without pocketing; where the water gets off you will find the bolts will leak without the pockets.

[481] Q. What shape is that sheet in when it is in the engine?

A. It is a little arched; it is not flat and level, it is high at the front end and sloped towards the back end.

Q. Is it buckled down like it is now in the middle?

A. No, sir; it is the reverse of that.

Q. It is arched up a little the other way, isn't it?

A. Yes, sir.

Q. How far down had it been forced from its true position, would you say?

A. Ten and three-quarter inches is what was measured there in the fire box while I was in it, is my recollection, that is what it was taken at. We had one of these folding rules and put it up there through the holes and measured down, that was measured by Mr. Slayton and the Government inspector, Mr. Williams, the Interstate Commerce Commission inspector.

Q. What effect would the forcing of the sheet down in its present position have on the pocketing between the bolt holes?

A. It would relieve them to a certain extent, that is, the pockets wouldn't be as deep as they were at one time before it blew down, before the bolt-heads gave way.

Q. How would that relieve it?

A. Stretching the material there would have a tendency to pull out or straighten them out.

Q. If the sheet was cold when it was forced down, that is,
[482] I mean, not overheated, with water on top of it, would it pull the pockets out then?

A. If it was forced down cold with the bolts in there?

Q. Yes, sir; with the bolts broken off under the head, as they were?

A. I do not think it would pocket, that is, if the bolts weren't there, there would be nothing to pocket, to force down in between the bolts, that is what caused the pocket.

Q. Did you ever seen the heads pulled off any of these button-head bolts like these are, under a crown-sheet, with water on top of it?

A. No, I never saw it.

Q. Did you ever see any crown-sheet bolts break off under the head that way with water on the sheet?

A. I never heard of one coming off with water on the sheet.

Q. Where is this bolt stronger, around the head or in the body of the bolt?

A. The body would be the weakest part.

Q. The body would be the weakest part?

A. Yes, sir; and it would break first if subjected to a pull.

Q. Have you ever tried a crown-sheet or a crown-head bolt to determine where it will break first?

[483] A. I have not personally; no, sir.

CROSS-EXAMINATION.

By Mr. Staples:

Q. How about if the head happens to be broke, the body wouldn't break first, would it?

A. No, sir.

Q. I mean if the head was cracked up in that thread?

A. No, sir; the body around closest to the head.

Q. I mean cracked up between the head and crown-sheet?

A. It would be weakened by being cracked that way.

Q. It would make that weaker than the body of the bolt?

A. Yes, sir.

Q. Is it or not true that the sudden letting go of a few bolts throws such an additional load on the adjacent ones that they are frequently unable to stand the strain and tear out row by row until the whole crown-sheet is blown down? Do you, or not, recognize that as being true of what happens to bolts when they are in boilers under those conditions?

A. You would have to have a great many bolts broken to do that; you could have a few bolts or quite a number broken without even the sheet pocketing.

Q. I am talking about if they were adjacent to each other.

A. I know, you might have quite a number broken and the sheet wouldn't even break at the ordinary boiler pressure.

[484] Q. Suppose a whole lot of the bolts had been injured by having low water before that, six or ten hours maybe before, wouldn't that weakness there make them give way quicker?

A. If the bolts were injured by being burned?

Q. Injured by heat or any way, say oil or scale or low water, or any way, I don't care how.

A. I was just figuring how these bolts were going to be injured without injuring the sheet or without showing.

Q. I didn't ask you that.

A. I cannot answer your question.

Q. I assume that as a fact, whether you think that would be a fact or not, I am not asking you that, but I am asking you that as a fact.

A. That if a few bolts were broken, it would do what, it would allow the sheet to blow down, is that what you mean?

Q. I will ask you the question again. Is it or not true that the sudden letting go of a few bolts throws such an additional load on the adjacent ones that they are frequently unable to stand the strain

and tear out row by row until the whole crown-sheet is blown down. Is that a fact or not?

A. I cannot say; I never saw that condition; I never saw that done.

Q. Don't you believe that when some of the bolts let go that it throws an additional strain on the other bolts?

A. Yes, sir.

Q. And if it does that it might distort other bolts, might it not, if the strain was increased sufficiently?

A. There would be more strain thrown on the other bolts.

[485] Q. And when it starts to go down you have got the momentum of the sheet started in motion?

A. It does not gain much momentum.

Q. The slightest motion when things are held tight, means a whole lot?

A. No, sir; I do not think so, it would have to go some distance before the momentum would amount to anything.

Q. I am talking about after some have already broken and the sheet has started its momentum, wouldn't that starting motion combined with the increased strain on the bolts, start them down?

A. I don't know that it would; of course if the bolts or bolt heads or so many were broken and the balance were overheated, they would give way if the pressure is sufficient.

Q. That is what I mean, the increased strain on the balance of those bolts on account of some of them giving way.

A. It would probably pull other bolts.

Q. And twist that out of shape, wouldn't it?

A. It would probably pull them in two.

Q. It would be bound to do it, wouldn't it?

A. Under certain conditions it would, that is, if the strain was great enough to, they would pull in two.

Q. That is what I mean. You say you are now in the railway supply business?

A. Yes, sir.

Q. What do you mean by that?

[486] A. Selling supplies or trying to sell supplies.

Q. To railroads?

A. Yes, sir.

Q. Did you ever try to sell any to the Virginian Railway Company?

A. Yes, sir; I have made several attempts to sell some to the Virginian.

Q. You have had a little success, haven't you, I reckon?

A. Not a great deal.

Q. You haven't sold them anything at all?

A. Yes, sir; I have sold them a little bilt, but not any to amount to anything.

Q. How hot do you think that crown-sheet would have to be to go down from low water?

A. I think it would be above a cherry red.

Q. It would have to be about a white heat, wouldn't it?

A. I don't know that it would be exactly at white heat, it would be between a cherry red and a white heat.

Q. If that crown-sheet had gotten that hot, and in that malleable condition, would that take all the life out of the iron?

A. No, sir.

Q. Would it stretch in that condition?

A. No, sir.

Q. I mean if iron is stretched in a hot condition like [487] that.

A. That is flanged steel and it will stand a great deal of heating and bending.

Q. What kind of steel?

A. Flange steel, fire box steel.

Q. I am talking about the iron in the bolts.

A. I thought you were referring to the iron in the sheet.

Q. I mean the bolts, if they got hot, wouldn't that take the life out of them and make them lifeless?

A. No, not unless they were heated up high enough to burn them, that wouldn't be high enough, white heat is welding heat and they often heat them to that.

Q. Is that your opinion that it will not, in that condition?

A. I say frequently they heat iron to a white heat for welding and it does not injure them at all.

Q. I never asked you would they do that or not.

A. You asked me if a white heat wouldn't injure the bolts.

Q. I said if they pulled and stretched in that condition.

A. It would rupture the bolts.

Q. Wouldn't it injure the quality of the metal?

A. No, I do not think it would injure the quality of the metal. Of course, the metal while it was hot would be softer and it would not have the strength it had before, up to that heat, it would not.

Q. The hottest part of these bolt heads would be the part [488] nearest the fire, wouldn't it?

A. Where the fire struck the bolt heads would be the hottest part.

Q. The bottom part ought to be hotter than the head then, if the bolt was on the crown-sheet at the time it was heated?

A. The heat was there then and it would probably heat at the same time.

Q. If that would start to go down the first thing that would fall would be the bolt head?

A. Yes, sir.

Q. It would be bound to be heated in there then in a fraction of a second in a hot fire like that?

A. If they dropped into the fire, you mean?

Q. Yes, sir.

A. They would be heated.

Q. There is no question about that, is there? They would be bound to be?

A. I do not think there was very much fire left in that ash pan in this particular case; it seemed to have been blown out.

Q. Isn't it true that the tensile strength of the crown-sheet and the bolts are about the same?

A. Very close; yes, sir.

Q. And whatever would break off the bolts would be bound to make a dent in the crown-sheet, wouldn't it?

A. Make a dent in the crown-sheet?

[489] Q. Yes, sir.

A. A pocket?

Q. Some sort of an impression in the crown-sheet, you couldn't break a bolt without making an impression on the crown-sheet, if the crown-sheet did not break, two things of equal hardness, or strength pressed up against one another, if one breaks you see a mark on the other?

A. No, sir.

Q. You couldn't very well strip those bolts off without making a mark on the sheet, could you?

A. If there was no water on the sheet and the sheet got hot, the bolt head would make an impression on the sheet if they were cold.

Q. I don't care what condition the sheet was in, hot or cold, if the pressure brought by that sheet on the bolt head is sufficient to make it break off, it would be bound to leave a mark on the sheet, wouldn't it? Can you hardly conceive it coming off and not do it?

A. It would leave some mark; it would vary according to the temperature of the sheet when it was forced down against the head.

Q. What I am talking about, hot or cold, you would have a mark there?

A. Very slight mark if it was cold.

Q. If it was cold, if the pressure was hard enough to break the bolt cold, wouldn't you expect the same kind of effect on the sheet as you did on the bolt?

A. Not with that flat surface, that wouldn't make much
[490] of an impression in a cold sheet.

Q. You do not think it would?

A. No, sir.

Q. Even if the strain was strong enough to break the bolt?

A. No, I do not think under those conditions that it would leave much of a mark or an impression there.

Q. Those bolts could not have been very well stripped off that crown-sheet without falling down in the fire and getting hot, no matter how they broke, could they?

A. As I said, I do not think there was much fire in this particular case, because when I got in the fire box I found the grates had been broken and twisted all around in there and it seemed the fire was blown out.

Q. I didn't ask you any such question as that.

A. If they dropped in the fire box they would get hot, yes, sir.

Q. That is what I mean, if the fire is right under the crown-sheet and these bolts ripped off like that, from the heat of the fire, sufficient to pull back like that (indicating), it would be impossible for them to strip off there without getting hot?

A. If they fell in the fire they would certainly get hot, if they were left long enough.

Q. And they are bound to fall in the fire, aren't they?

A. They would, of course, if they came off and there was a fire down there they would fall in the fire.

Q. Can you conceive then the bolts breaking or stripping
[491] off that crown-sheet without getting down in the fire and getting hot?

A. I can if the steam came down and put the fire out.

Q. Then the steam would have beat the bolt head down, wouldn't it?

A. The bolt wouldn't be in the fire long enough to heat it. The one or ones that I picked up was on the side of the ash pan where there wasn't any fire.

Q. Can't you find out for us how much water was in that tank when it got to Princeton? I mean how many gallons?

A. Approximately I think I can.

Q. Hasn't that been figured out?

A. I don't know whether it has or not. Do you know, Mr. Slayton?

Q. I mean as to the quantity that was in there.

A. Mr. Slayton had a stick that was marked for those M. C. tenders, do you know how much that was to the inch? (Witness speaking to Mr. Slayton.)

Q. Now, these injectors, what happens to the water that goes into the injector when it breaks?

A. It goes out of the overflow.

Q. The overflow or tell-tale hole?

A. That is what they call the tell-tale.

Q. How big a stream goes out of that?

A. The regular overflow pipe on these engines was 2½ or 3-inch pipe, 3 inches I think, that went into the flare of the ash pan to put out the fire that might drop there, and there was a
[492] three-quarters of an inch pipe just bent around in an L shape so the engineer could see it from the cab, the main overflow went into the ash pan where the engineer could not see it.

Q. If the injector was open and not working there would be three inches of water running out, the full capacity, would be running out and into the ash pan from the tank?

A. If the water valve was open wide enough.

Q. If it was all the way open?

A. Yes, sir.

Q. I want you to tell me if both water valves were wide open and left wide open an hour, whether or not all the water would run out of that tank, through both of those holes in an hour, if the tank was half full when he started?

A. You mean the water run out of the tank through the injectors?

Q. Through both of the overflows, if both of the overflows were left open.

A. There are two valves there, one is the overflow valve and one is the water valve.

Q. I am talking about the place where the water goes when it flows through the injector and doesn't go into the boiler.

A. If both valves were opened the water would flow from the tank out of the overflow.

Q. Into the ash pan through the pipes?

[493] A. Yes, sir.

Q. If both were left open an hour, wouldn't it throw all the water out of the tank, if the tank was half full when it started?

A. I am not positive about that. If the thing had a siphon to start the water out it probably would carry it all out.

Q. What do you mean by a siphon?

A. I mean if a vacuum was created there and no air pressure opposing it, it would continue to flow.

Q. It would flow—the injector is below the tank?

A. Yes, sir; the overflow runs up some above the injectors, the overflow pipes are above the injectors.

Q. Above the injectors?

A. Yes, sir.

Q. If it gets a start it pushes on over, doesn't it?

A. I don't know whether I can answer that question or not. I cannot say I am familiar enough with it.

Q. You mean you don't know whether the water runs through that overflow, runs through that pipe when it starts, don't you know that?

A. I cannot answer that positively; I do not remember exactly the construction of that injector, where the water would go, or whether the water would go there without being forced there.

Q. That injector is a non-lifting injector, and when water is flowing naturally from the tank into the injector without any pressure at all, isn't it bound to flow that way?

A. I don't know whether that water would flow into [494] there or not through the overflow pipes.

Q. Didn't you tell the jury a little while ago it would do it?

A. I do not think so.

Q. Didn't you tell them the water would run through there when it wasn't going into the engine?

A. That is with steam behind it.

Q. The steam doesn't force it into the overflow?

A. Yes, sir; where your injector is working you have got the water valve opened and if it breaks the steam will force that the other way instead of through the boiler.

Q. You don't need any steam to force it, you have got the whole tank of water behind it, haven't you?

A. I think under some conditions that water would be siphoned through that injector ordinarily; I don't know positively wheth-

er it would go through there whenever you opened that water valve or not.

Q. If both of those injectors were working and then stopped working wouldn't the water run on out through the overflow?

A. If the injectors had been working and stopped?

Q. Yes, sir.

A. And the water started to go through the overflow?

Q. Yes, sir.

[495] A. In my opinion it would run out; yes, sir.

Q. Can you identify any bolt over there as having been the one you saw that came out of this boiler?

A. No, sir.

Q. Do you remember the number of engine that came in this shipment?

A. 462 to 473.

Q. At what intervals did they come, how long apart were they?

A. I do not remember just the interval between each engine, when they were delivered they were coming along, my recollection is —I don't know— I have got them mixed up with some other engines I got, I couldn't say.

Q. They probably came one or two a week, didn't they?

A. I think so.

Q. How long was it after all under that contract came before they commenced sending those under the new contract?

A. I should say, approximately, it must have been about a year.

Q. A year?

A. That is my recollection; that we had been using these ten engines a year before we purchased eight more. I haven't anything to check it with but that is my recollection.

Q. Were they all made from the same specifications?

A. The specifications may have varied in some slight particulars, but I do not know.

Q. They were practically the same engine?

[496] A. Yes, sir; practically the same.

Q. No essential change?

A. No, sir.

Q. I wish you would look at this thing over here and tell us what you think about how hot that thing was heated on the other side there?

A. I don't know that I could tell you that, from the appearance

here, about the fire box, the temperature—I have nothing to tell just what it was.

Q. Was it the ordinary fire box temperature?

A. I cannot give you that exactly.

Q. I do not mean the degrees.

A. From the appearance here I would say about a fire box temperature.

Q. You mean about the heat that water in the boiler is when it is under a pressure of 185 pounds?

A. Something about that.

Q. That is two or three hundred degrees?

A. It looks to me about the same as the fire box heat.

Q. Does it look like there was water in it when it was heated or not?

A. It may have been heated with water on it or off it.

Q. You cannot tell?

A. No, sir.

Q. Do you know who kept those bolts or bolt heads that came out of this boiler, out there; I do not mean the bolt heads, but the bolts and stays?

A. The boiler shop foreman had instructions to save the [497] bolts. You do not mean the heads?

Q. No, sir; the stays.

A. The boiler shop foreman had instructions to save those bolts, Mr. Bowden.

Q. What did he do with them, do you know?

A. No, sir; I don't know what he did with them.

Q. Don't the bolts help to determine what causes a failure of a crown-sheet like this?

A. The bottom ends of those bolts were blue.

Q. I didn't ask you about the appearance of them. Just read the question to him.

(Question is here read to the witness.)

A. Yes, sir.

Q. Does iron stretch better when hot or cold?

A. It gets softer at the higher temperature and it stretches easier when it is hot.

Q. It stretches even when it is a fire box temperature, if it goes down?

A. Yes, sir; it expands.

Q. If the bags, the slight bagging in between the bolts has been made before the time of failure, say six or eight hours, and the sheet had not leaked any, and the bolts gave way when the metal was in a fire box temperature, you wouldn't look for all the bags to stretch out, would you, which had been previously formed?

A. If the sheet was blown down, do you mean?

[498] Q. At a fire box temperature; yes, sir.

A. If the sheet was blown down in the shape this had been, if there was bagging there, it was bound to stretch or decrease the bagging.

Q. You wouldn't look for it to decrease as much at a fire box temperature as if it had been hot, would you?

A. I think at a higher temperature the less bagging would show there.

Q. Isn't it true that if that crown-sheet had been about a white heat that every sign of a bag would have stretched out of it, if it had been a white heat when it came down?

A. I cannot say that they would all be stretched out, I think there would be some left in there. When those bolts pulled off they relieved the pressure to some extent, but if the pressure remained on it would have stretched them all out.

Q. When metal gets hot it expands, doesn't it?

A. Yes, sir.

Q. If there is damage done to one bolt or several bolts, in a crown-sheet ,and the crown-sheet is afterwards heated up to a fire box temperature, wouldn't that have a tendency to close up any little leaks or holes that might have been made there by the expansion of the bolts and also the sheet?

A. I don't know as I understand you. If the sheet had been hot and expanded?

Q. No, I said if the sheet has been injured, if the bolts [499] have been damaged, so that it leaks a little bit.

A. Damaged in what way?

Q. Any kind of way, so it will get a little hole around it and loosen the fit of the thread and then it gets hot, it is heated up to a fire box temperature?

A. I cannot understand. If the bolt is injured, if the bolt is a good fit in the sheet—

Q. (Interposing.) Suppose it was done by previous burning?

A. I don't know how you are going to injure that bolt.

Q. Can't you imagine a bolt getting a little loose or the threads being a little loose?

A. That was in that condition at first and might have leaked a little at first?

Q. I said, assuming it was leaking, and the fire is cold and the water is not up to a boiling point, and the bolts are leaking a little. Now, the engine is fired up to a good hot fire and the pressure is brought up and heat on the bolts and also the crown-sheet is gotten up to a good fire box temperature with a pressure of 185 pounds, now wouldn't that increased heat of the bolts and of the crown-sheet cause an expansion so as to check the leaks which had previously existed?

A. I know if you put a fire into an engine without water in there that you will find it will cause the bolts and some of the steam of the stay-bolts to leak.

Q. That is from expansion, isn't it?

A. Yes, sir.

Q. You think that is correct, don't you?

[500] A. I have seen it done. I have seen fire put in an engine without any water in it, and the fire was afterwards knocked and by the pressure on the boiler the stay-bolts and flues leaked.

Q. Do you or not think it would have a tendency to stop or check a leak, as was testified to by one of the engineers?

A. No, that would cause a leak.

RE-EXAMINATION.

By Mr. Hall:

Q. When you speak of putting a fire in an engine without any water in it, and it causes the flues and crown-bolts to leak, was it under pressure then?

A. No, sir.

Q. Suppose you heat it up without any water on the crown-sheet with the steam pressure on it, does that have a tendency to make it leak more? I mean to expand it or force it out of position so that it will leak more when water it put on it?

A. If you have pressure on it, it will cause it to leak more when you put water in it.

Q. When you put water in it?

A. Yes, sir.

Q. You were asked about whether these bolts might not

[501] have been burned in the fire after they fell down. If those bolts fell down into the fire and the crown-sheet came down, letting the steam and water out through there, how long was the fire in there after the bolts got in the fire?

A. There was hardly anything left of the ash pan at all except the grates; there was no fire for those things to remain on, it was blown out.

Q. Do you mean to say that an explosion of that kind, with 185 pounds of pressure, would put the fire out instantly, blow it out?

A. It would blow it out and put out what remained in the pan.

Q. You were asked some questions based on the supposition that some of those bolts or heads were cracked around the head. Do you know any way they could be cracked around the head; I mean in the ordinary use of them in the boiler?

A. No, I do not think it is possible to crack, that is, in inserting the bolts. What I was referring to, where you make a test of pulling the bolt heads off, you would have to use a hack saw in order to make it come off, and nick out.

Q. If you do not nick them, where does it break?

A. In the body.

Q. Did you ever see one broken otherwise and pulled out of the head like those are?

[502] A. No, sir.

Q. I mean cold?

A. Yes, I understand.

RE-CROSS-EXAMINATION.

By Mr. Staples:

Q. How hot was that crown-sheet heated, the one you saw without any water in it?

A. I couldn't say what the temperature was.

Q. Did you look to see what color it was?

A. No; I don't know that the sheet was discolored.

Q. You don't know how hot it was?

A. No, sir.

Q. Now, when this crown-sheet blows down up in the front part of the engine, that is, up in the forward part of the crown-sheet, isn't there a brick arch right under there?

A. The brick arch is some distance from that; it starts at the bottom at the flue-sheet and runs up toward the back of the fire box.

Q. It is down below that?

A. Very much below it at the front end; all the flues come between the top of the crown-sheet and the brick arch.

Q. Is the brick arch further to the front or to the back than that? Is it further to the front?

A. It starts at the front and does not run all the way to the back end of the fire box.

Q. If the crown-sheet were to blow down, the first thing
[503] it would hit would be the brick arch, wouldn't it, and all the pressure would go out into the fire box, or it would be given that tendency by the brick arch?

A. The escaping steam would come on the brick arch. I don't know if the crown-sheet would come down that there would be fire enough to heat the brick arch.

Q. And then it would have a tendency to go out in the cab of the engine?

A. Into the ash pan or any other openings there.

Q. You don't know whether that steam blew that fire out or not, do you; you didn't go there?

A. I saw it in Princeton and everything was in such an upset shape, the grates were broken.

Q. But you don't know whether that fire dropped down and stayed down; it might have been cleaned out by a man?

A. There was some cinders and things in the pan, the pan had not been cleaned out when it came in.

Q. You don't know whether the men there, that came there after the accident to move the engine, cleaned out any of it, do you?

A. Judging from the appearance they had not, because the broken grate bars were laying in on top of the little fire that remained in there that the steam did not put out, and the pan had a lot of cinders in it.

Q. That is just your opinion?

A. From appearance; yes, sir.

Q. You don't know?

A. I don't know; I wasn't there, and I cannot say.

[504] (Witness stands aside.)

[505] R. L. BOWDEN, RECALLED.

R. L. Bowden, recalled, for defendant:

Further cross-examination by Mr. Staples:

Q. Mr. Bowden, what method did you use for testing your stay-bolts?

A. We tested all the rigid stays with a hammer, and under air pressure, and also the principal stays are tested under an air pressure with at least one hundred pounds of air pressure, all flexible stay-bolts.